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The Mining Journal

LONDON, JUNE 12, 1959

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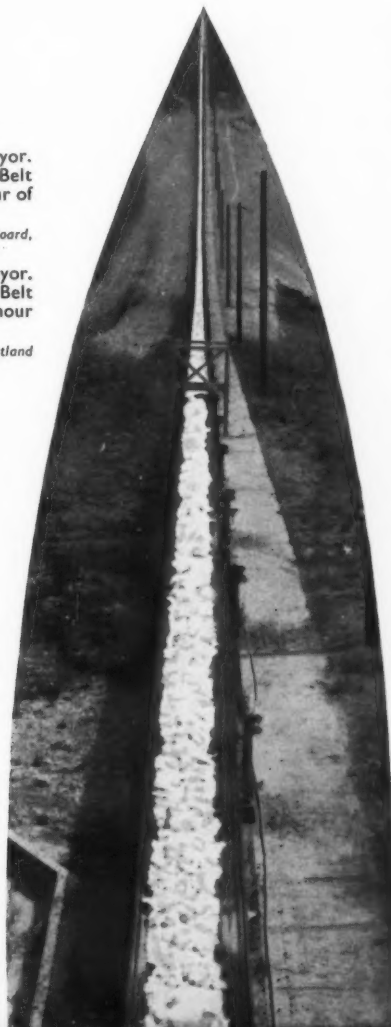
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Left: CABLE BELT rope driven conveyor.
Length 7,500 feet, Lift 220 feet, 42 in. Belt
at 350 ft./minute, handling 600 tons/hour of
R.O.M. Coal.

Photograph by permission of the National Coal Board,
East Midlands Division, Bestwood Colliery.

Right: CABLE BELT rope driven conveyor.
Length 7,260 feet, Lift 300 feet, 24 in. Belt
at 200 ft./minute, handling 200 tons/hour
of chalk.

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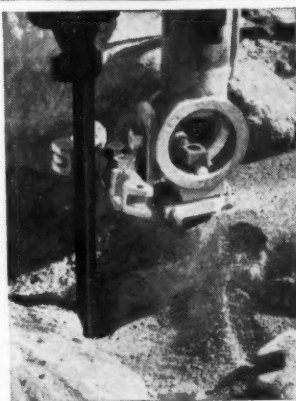
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The Mining Journal

London, June 12, 1959

In this issue . . .

Why Flog Such a Good Investment? . . .	643
Geological Survey in Uganda . . .	644
Crisis in Mexican Mining . . .	645
Aluminium in Surface Installations . . .	646
Mineral Resources of Bechuanaland . . .	648
Plants as a Guide to Mineral Prospecting . . .	649
Mining Miscellany . . .	650
Company News . . .	651
Machinery and Equipment . . .	652
Metals and Minerals . . .	653
Mining Finance . . .	655
Company Meetings and Announcements . . .	656
Obituary: Mr. A. T. Holman . . .	658
Professional Directory . . .	659
Publications Received . . .	660
Coal and Iron in Vietnam . . .	661
London Metal and Ore Prices . . .	cover iii

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Why Flog Such a Good Investment?

THE United States Federal Government maintains three separate stockpiles of strategic materials. Most important of these is the national stockpile, established in 1946, which now contains a three-year supply of materials deemed necessary to supply United States industry in the event of war or national emergency. Until two years ago this stockpile held a five-year supply of each commodity, but effective from July 1, 1957, stockpile objectives were reduced to a three-year basis.

Secondly, there is the Defence Production Act inventory stockpile, which was an outgrowth of government buying of strategic materials both abroad and in the United States to fill requirements raised by the Korean War. Materials listed in this stockpile as surplus include aluminium, cobalt, copper, fluorspar, lead, nickel, tungsten, and tin.

A third hoard is the supplemental stockpile. These materials were acquired when the United States exchanged surplus farm commodities for offshore strategic materials. These barter arrangements have piled up surpluses of lead and zinc, but because Uncle Sam still wants to get rid of his farm surpluses the programme is being continued, though at a slower pace than in former years.

Government officials have estimated that altogether there is about \$10,000,000,000 worth of materials in these three stockpiles, half of which are defined as being "surplus" to United States needs. This has become a considerable embarrassment to the Administration, which is rather in the position of a man who has picked up a snake and doesn't know what to do with it, but is afraid to let it go. By allowing political motives to be grafted on to what should have been purely strategic considerations, Uncle Sam created a monster of such proportions that it has cast a shadow over the domestic mining industry and is becoming a source of anxiety to mineral producers and metal dealers throughout the non-Communist world.

Even in the halcyon days (for mineral producers) of high prices and artificial shortages created largely by government purchasing programmes, it was evident that stockpiling would not last for ever. At the same time it was equally apparent that the stability of world markets could only be secured so long as there was confidence in the integrity of the United States Government as a minerals banker. Until recently that confidence has not been undermined.

To give only one example, in the past few weeks, we have seen the price of copper fall and rise like the barometer in unsettled weather conditions with every report and denial that the United States Government was proposing to dispose of its surplus metal. This state of market jitters was precipitated by a proposal of the Office of Civil and Defence Mobilization (OCDM) to sell to private industry 128,000 tons of copper from the DPA stockpile. Resolutions condemning the disposal were immediately adopted by the Senate and House interior committees, and OCDM then announced that it would not attempt to sell the copper. OCDM has also promised to notify Congress in advance of any plan to sell stockpiled metals or minerals.

Now there appears to be a battle between the United States Administration and the Senate on the issue of whether the national

stockpile should be reduced or frozen. Officials of the General Services Administration—the government agency that buys, sells, and stores surplus materials—recently told the House Appropriations Committee that they favoured a gradual plan to dispose of quantities of surplus materials when it could be done so as not to disturb United States and world markets. They envisaged disposals over a period of ten, or if necessary twenty, years or even longer.

The House Appropriations Committee has given ample evidence of its dissatisfaction with the huge expense involved in acquiring and maintaining the stockpiles—storage alone is costing the government millions of dollars. By refusing to give GSA \$49,000,000 to rotate deteriorating rubber, fibres, and oils in the stockpiling programme for the fiscal year 1960, it ordered, in effect, that GSA should dispose of these items and not replace them. The committee has also refused to re-appropriate unspent 1959 fiscal year GSA funds. This will give the Administration an opportunity of coming to Congress in 1960 with a programme to cut the stockpile back to manageable proportions. The Administration, in fact, is reported to be putting forward a plan for transferring the estimated \$4,000,000,000 of excess goods into a special inventory that could be sold off with a minimum of formality. This plan will go to Congress for approval next year.

The Senate—which has shown itself more responsive than the House to the fears of basic commodity producers—seeks to ensure that stocks will never be dumped onto the open market.

Disposals of any materials in the national and supplemental stockpiles must be proposed to Congress by the President, approved by the interior and military affairs committee of both chambers, and finally by the entire House and Senate. Bills aiming to make the DPA inventories almost untouchable also were recently introduced in the House and Senate by Mr. Wayne N. Aspinall and Senator James E. Murray respectively. Backed largely by congressmen from the Western States, they require that before OCDM can order the disposal of materials from the DPA inventory, approval must be expressly given by the interior committees of the House of Representatives and the Senate, who will have thirty days in which to accept or reject the disposal plans.

This bill is considered to have an even chance of getting through the Senate and House. Western senators have learned from the White House, however, that, if passed, it will be vetoed by President Eisenhower. According to *The Journal of Commerce*, the strategy of the Upper Chamber will, therefore, be to add the measure as a rider to other legislation.

In the case of countries which are heavily dependent on overseas sources of supply, a strong case can be made out for stockpiling strategic minerals and metals on security grounds. The American Government, however, has continued to pile up mountains of materials which were surplus to strategic needs, partly through the wider political aim of strengthening the under-developed countries in the conflict between the Free World and the Communist bloc, and partly through the more narrow interplay of domestic interests.

While the immediate cause of the recent slump in metal prices was excess of production over consumer demand, there is no doubt that United States stockpiling policy, by accelerating the growth of production capacity, was one of the factors principally responsible. In order to bring supply into balance with demand, the production of ores and concentrates has had to be severely pruned, while the difficulties of lead and zinc exporters have been aggravated by the imposition of United States quota restrictions. In these circumstances, any plan for selling from the Ameri-

can stockpiles, however gradually, could only have the effect of weakening market confidence and impairing the recovery that has begun. Any talk of disposing of \$4,000,000,000 of excess commodities could scarcely be more ill-timed.

To those who believe—as the Eisenhower Administration must surely do—that in the long term the problem facing the United States Government is not the disposal of surplus metals and minerals but the procurement of sufficient needs, it seems surprising that the stockpiles are not more widely recognized to be one of the finest investments which the United States, however inadvertently, has ever made, more especially as she is rapidly becoming a "have not" country. In the perhaps not too distant future, when Russia and Communist China catch up with their own mineral resources and join the world scramble for available supplies, America's chief concern may be to prevent the existing stockpiles from being too rapidly depleted! An investment of \$10,000,000,000, plus storage charges, is obviously scarcely beyond the financial resources of Uncle Sam.

It cannot be disputed that the sale of \$4,000,000,000 worth of stockpiled materials over a period could make an impressive contribution towards reducing the dollar drain (providing, of course, that it could be carried out at prices approaching the levels on which the estimated value of the materials has been based). Moreover, the reduction of stockpiled metals is likely to be urged upon the Administration by the urban congressmen, who have already revolted against the huge payments to United States farmers for price supports and storage of commodities, and might thus be politically attractive. Producers of minerals and metals can only hope that the Administration will take the longest view.

When all is said and done, and without minimizing the benefits which producers have gained from the stockpiles over the years, the metal mining industry must face up to the fact that, if the more alarming proposals were to be taken at their face value, the effects on the metal markets could easily be such as to precipitate the most disastrous situation which has been experienced for a quarter of a century. It seems scarcely conceivable, however, that the American Government would present the Russians with such a magnificent opportunity of acquiring immense quantities of strategic materials at bargain prices!

Postscript: The latest report, received as we go to press, states that Senator Murray has re-introduced a resolution originally submitted in 1956, which calls for a national minerals policy to stockpile additional strategic materials as an insurance against unforeseen developments!

GEOLOGICAL SURVEY IN UGANDA

The annual report of the Geological Survey Department of the Uganda Protectorate for the year ended December 31, 1958, is now to hand. Bearing the signature of A. Cawley, director of the Geological Survey, the report states that a total of 3,351 sq. m. of Uganda territory was geologically surveyed during the year, an increase of one-third over the area covered in the previous year.

In an attempt to locate new mineral fields, mineral exploration was spread over as broad an area of the country as possible. Although no notable finds have yet been made, evidence of mineralization has been found in several areas formerly considered to be barren.

Reports were completed on two radioactive areas in northern Karamoja originally located by airborne scintillometer. Further examination revealed no workable con-

centrations of radioactive minerals but a more promising area, several miles to the east, was later found by surface prospecting.

The investigation into thorium minerals disseminated in a granite in south-eastern Uganda is drawing to a close. Although a most interesting collection of economic minerals occurs, none has been found concentrated in quantities worth exploiting. All these investigations have been greatly assisted by the use of more sensitive instruments than have been available before.

An iron orebody occurring at Mugabuzi, northern Ankole, referred to in the report for 1957, was finally proved to contain 1,750,000 tons of medium- to high-grade ore, calculated to a maximum depth of 200 ft. Although the ore-zone probably extends to greater depth, this cannot be proved without drilling. Sampling showed the ore to contain low titanium with a dominantly siliceous gangue. The phosphorus content was higher than expected varying between 0.1 and 0.3 per cent. The occurrence of barytes was noted during the same investigation.

Work was completed on the occurrence of chromite, north of Moroto. The possibility that any large deposit exists is remote, and only a large body could be exploited profitably in such an area. Gravity work may be done later to confirm the results of the investigation. General prospecting was also done in the Labwor Hills of Karamoja from which area there was formerly a small production of mica.

Drilling in the Eccia division of the Karroo shales at Bugiri is now complete without indications of coal having been found. An exploratory hole is being drilled to intersect a typical Kigezi-type "gossan" in depth. Whether such rocks are, in fact, true gossans is unknown, but if this body is found to be mineral-bearing in depth, a closer inspection will be required of the many similar outcrops in the same area.

Work was continued at Kitaka lead mine to assist in the exploration of the sulphide orebody. A geochemical method of surface exploration was adapted for use in tracing extensions of the mineralized zone; this work has now been taken over by the company's geologists. Although a large orebody has still not been proved at Kitaka, the indications are promising. The diverse nature of the mineralization is in great contrast to the more usual monomineralic veins further to the south. Lead, zinc, copper, gold and tungsten minerals have been detected.

General work was continued on pegmatites. Aspects of beryl mineralization are now being investigated by United Kingdom Atomic Energy Authority geologists in the field, the spectrographic analyses being done at Entebbe by the Geological Survey.

A geologist was stationed for the greater part of the year in the Ankole tinfield. Part of his time was spent in tonnage and reserve calculations resulting from the previous year's fieldwork on the Mwirasandu mine dumps. Reports were also made on Naniankoko and Kaina mines. The gold-bearing potentialities of the flat-lying reefs in the Busia area require further investigation.

CRISIS IN MEXICAN MINING

Mexico's mining industry is passing through a period of adjustment to protracted low prices for metals, especially lead and zinc, and the reduction of imports by the U.S. But, instead of forming a united group to seek ways and means of circumventing the present situation, warring camps within the industry issue conflicting statements of "crisis" and "no crisis", of "reduced production" and

"increased production", of "dependency on the United States as a prime market" and "non dependency on the U.S. through build up of foreign markets" and so on.

This is typically Mexican for at no time, even in eras of prosperity and economic progress, is it possible to obtain a clear-cut picture, statistical and economical, of the status of an industry. And mining is no exception.

The current chaotic conditions within Mexico's mining industry, and confusion caused by conflicting statements, are increased by so-called official statements in which optimistic reports are issued contrary to the visible general downward trend of the industry.

There are, here and there, sober-minded individuals and organizations which try to present a true picture. One of these is Deputy Antonio Aguilar, heading a commission studying mining problems.

In a hard-hitting statement, Deputy Aguilar told the Chamber of Deputies that the mining industry is facing "the most serious crisis" of its history. Unemployment in the ranks of miners has now exceeded 40 per cent and that of approximately 90,000 miners, 40,000 may be without jobs, with little prospect of early re-employment. Further, at least 5,000 additional workers are to be pensioned off immediately, since mines are finding this more expedient than keeping them on payrolls until retirement dates. This applies only to miners who have been employed for 22 to 23 years, having but two to three years more to go before automatic retirement—in operations where managements do give retirement pay. Unfortunately, in Mexico, pensions are not widespread throughout the industry.

To date, four major mining operations in Monterrey, Peñoles, San Luis Potosi and Torreon, have ceased work and these are to be followed by eight others, including the Mexican Mining Co. of Zacatecas, the Morales and Ocampo Mines, and others. All of these operations, be it noted, are under full Mexican management. But even such operations as the foreign American Smelting and Refining are feeling the pinch.

It is learned that in eight additional lead and zinc mines considering suspension, there may be a 50 per cent cut-back in labour, to attempt to weather the storm. But solutions of the problem, according to Deputy Aguilar, are not very promising because, "even if Mexico does seek new markets, it is only the United States that can purchase our production; and despite the reduction in prices these are much higher than those offered by European nations because of the high cost of transportation".

Mining Union secretary Filiberto Ruvalcaba has been in Washington hoping to come to some arrangement that can be of direct benefit to Mexico. But at this writing he has not issued his report, although he has been closeted with President Adolfo Lopez Mateos and the Secretaries of Labour, Foreign Relations and National Economy recently. None of these talks has ever been made public.

Meanwhile, the Federation of Small Miners has flatly come out against federal proposals to reduce production of lead and zinc during the current situation. The Federation stand is that this would not be a healthy manoeuvre, for it would close down sources of employment and aggravate the already extensive unemployment problem within the industry.

Small miners, with no other source of income, have another great fear—that they will be squeezed out by the powerful companies. But, in the light of current developments, there is every indication that Mexico's weaker miners, despite all their efforts and appeals for federal aid, are heading into a period of inactivity and possibly bankruptcy.

ALUMINIUM IN MINING—II.

Aluminium in Surface Installations

IT appears to be a trend in mining operations that more and more work is carried on above ground. The increasing complications of ore separation and treatment and the problems of waste disposal call for bigger and better buildings and bigger and better transportation facilities. In both of these aluminium plays a part.

Another important aspect of the mining picture above ground is the exploration for new orebodies. Aluminium diamond drill rigs and rods, as well as surveyors' stakes and a new design of stacking core tray, are all made in aluminium.

The chief factors contributing to the choice of aluminium for installations, as in Eldorado's mill at Port Radium, are savings in transportation and erection.

More aluminium has been used in rail cars for carrying ore than in any other single application connected with the mining industry. The two largest users are the Roberval and Saguenay Railway and Alumina Jamaica Ltd.

The Roberval and Saguenay cars are of two basic designs; the first batch of ninety built between 1948 and 1951 have riveted aluminium bodies with steel underframes and weigh 36,000 lb.; welding of joints and the substitution of aluminium in the under-frame eventually brought the weight down to 32,400 lb. on subsequent production runs. These cars were built by Canadian Car Company and Eastern Car Company, and the final evolution of the design allows a weight saving of 16,000 lb. per car; the "70-ton" car can now carry 89 tons of bauxite from Port Alfred to Arvida.

The following article, the second of two, describes the use of aluminium in surface applications throughout the mining industry, with particular reference to Canada. The article in its entirety has been condensed from a survey in Precambrian by B. H. J. Edmond, development engineer, mining industry, Aluminum Co. of Canada Ltd.

Alumina Jamaica Ltd. now has forty-six aluminium hopper cars in service of which thirty-three have aluminium centre sills as well as aluminium bodies, thus representing the greatest weight saving. Some of these cars were built by Marine Industries and the rest by National Steel Car.

The Dominion Wabana conveyor boom illustrates an interesting structural application of aluminium. With a cantilevered structure, the basic design problem is to reduce deadweight. This can either allow a greater volume of material to be handled for a given size of boom, or allow a longer boom to be built for the same capacity. Similar arguments apply to the design of crane booms and bridges in aluminium.

The boom for Dominion Wabana Iron Mines was made by Stephens-Adamson, comprising a composite aluminium and steel design with riveted joints. A more striking demonstration of the design advantage of aluminium is a boom used by McNamara Construction on the S.S. *Niagara* for sand and gravel conveying for construction work. This was a welded all-aluminium structure made by Carter Bros. (Waterloo) Ltd.

Successful service with aluminium dump trucks dates back to 1932, when they were employed on the Hoover Dam project. Operators of the units were very satisfied

The aluminium-covered concentrator building of Eldorado Mining and Refining at Port Radium



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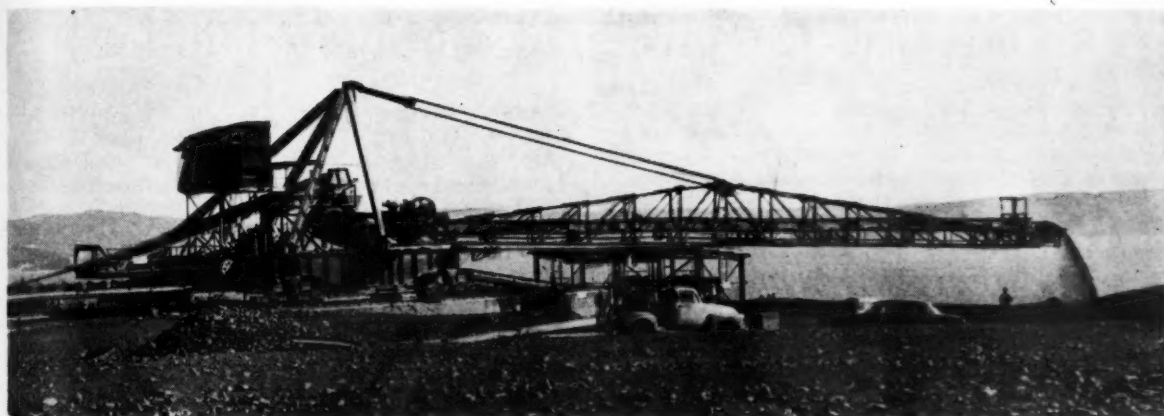
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T6

75SO
T6

123

135TS
T6

350T4



A 125 ft. aluminium mine boom for iron ore transfer. The equipment was manufactured by Stephens-Adamson for Dominion Wabana Iron Mines

with them. Since that time they have proved their worth in a wide variety of applications.

Only within the last two years, however, have they begun to be produced in quantity. This is due to the development of higher strength aluminium alloys and greatly improved techniques in welding. The next five years may well see production of aluminium on dump trucks of all types reach 50 per cent of total production.

Among the most active builders of aluminium dump bodies are Argon Electric Welding of Montreal, Atlas Hoist and Body of Montreal, B. K. and B. of London, Carter Bros. of Waterloo, Truck Engineering of Woodstock, Westeel Products of Regina, and White & Taylor of Vancouver.

Lightweight aluminium alloy drill rigs have decided advantages compared with those of steel or wood. The corrosion resistance is a factor in comparison with steel, but the weight of aluminium tube is also more attractive

than solid wood structures. The ease of handling cuts down set-up times and, of course, greatly reduces haulage costs for exploratory work in the bush. Some of the exploration companies are employing aluminium drill rods made out of Alcan 75ST-6 for the same reason, and one company has made up a complete drill rig out of aluminium that can be carried by one man.

One of the most interesting applications of aluminium in this field in recent years is the aluminium stacking core tray. Since the aluminium trays, made out of sheet metal, can be stacked, they occupy about one-eighth the space of wood trays when empty. The weight is cut to a half, an important factor when core has to be flown from site.

ALUMINIUM ALLOYS COMMONLY USED IN THE MINING INDUSTRY

Alcan alloy and temper	Tensile strength		Elongation	Brinell Hardness	Fatigue Endurance	Weldability	Corrosion Resistance	Application Remarks
	Yield	Ultimate	32%		7,000 psi			
3SO	7,000 psi	16,000 psi	32%	28	7,000 psi	A	A	Roofing and siding (Alcan Utility sheet approximately the same as 3SH14), Core trays.
H14	20,000	21,500	8	40	9,000			
H16	23,000	25,000	5	47	9,500			
H18	27,000	29,000	4	55	10,000			
24SO	12,000	29,000	18	42	12,000	C	C	Air legs, drill rods, skip liners.
T3	47,000	68,000	19	120	18,000			
T4	52,000	70,000	19	105	18,000			
B51ST4	22,000	36,000	20	—	—	B	B+	Pipe, structural sections.
T6	43,000	46,000	13	—	—			
B54SO	15,500	38,000	23	—	—	A+	A	Best choice of sheet and plate alloys for welded structures, particularly if subject to shock loading.
H11	30,000	44,000	16	70	19,000			
A56SO	20,000	42,000	35	—	20,000	A+	A	Structural sections especially when welded.
H34	40,000	50,000	20	98	—			
H38	48,000	58,000	15	107	—			
65SO	8,000	18,000	22	30	9,000	B	B+	Widely used as plate, sheet and sections for riveted and bolted structures.
T4	21,000	35,000	22	65	13,000			
T6	40,000	45,000	12	95	13,500			
75SO	15,000	33,000	17	57	—	C	C	Drill rods, wear plates and guide shells.
T6	72,000	82,000	11	150	22,500			
I23	9,000	19,000	9	40	6,500	B	A	Popular low-strength casting alloy for housings, etc. Not for structures.
135T5	20,000	25,000	2	60	7,500	B	A	General purpose foundry alloy for structural applications.
T6	25,000	36,000	4	70	8,000			
350T4	25,000	45,000	14	75	7,000	Not weldable	A	High strength casting alloy used.

Mineral Resources of Bechuanaland

LAST week it was reported that the Rhodesian Selection Trust group of companies and the African Authority for the Bamangwato Tribe had signed an agreement granting rights to carry out prospecting and exploration operations over an area of approximately 40,000 square miles of the Bamangwato Tribal Area in Bechuanaland. This area lies in the eastern part of Bechuanaland, and is in the shape of a triangle with its base to north and its apex about 100 miles south of Serowe.

The Bechuanaland Protectorate is one of the three High Commission Territories in Southern Africa, the others being Basutoland and Swaziland. Its mining history goes back to 1866, when the existence of a goldfield 80 miles long by two or three miles broad was established by H. Hartley and Karl Mauch. By the end of 1872, between 1,500 and 2,000 oz. of gold were reported to have reached Britain from Tati. Only two or three companies survived, however, the most notable being the Tati Concession Mining and Exploration Co. Ltd., forerunner of the Tati Co. Ltd., which owns the Tati Territory, with all mineral, afforestation, agricultural, and trading rights.

Mineral Production

In modern times gold production in Bechuanaland has been very largely confined to the Tati district. From July, 1895, up to the end of 1948, gold to a value exceeding £2,000,000 was produced in the Tati area. In recent years, however, production has been on a small and dwindling scale, amounting in 1957 to only 190 oz.

Apart from gold, there has so far been little mineral production in Bechuanaland, but the activities of the Bechuanaland Survey—established in 1948—have led to the export of both asbestos and kyanite. Chrysotile asbestos is produced at the Moshaneng Mine near Kanye, in the Bangwaketse Reserve, where it occurs as seams within altered and serpentinized Transvaal dolomite in proximity with later dolerite intrusions of considerable dimensions. Output has been increasing and amounted in 1957 to 2,466 s.tons compared with 1,110 s.tons in 1956. A limited amount of kyanite is produced from the Halfway Kop mine, 10 miles south-east of Francistown in the Tati Concession. Some gold and silver is also produced in this area from small workings.

Two small manganese mines were opened in the south-eastern Protectorate during the second half of 1957, following the award of Crown Grants to mining companies. In the Bangwaketse Reserve, there is a deposit in which ore occurs as pods and larger lenses in a shale horizon immediately overlying the Black Reef quartzites of the Transvaal system. Active development is in progress. A small quantity of ore has been exported from the second occurrence, which is in the Bamaletse Reserve. A characteristic feature of both occurrences is that the manganese ore is very low in iron.

In recent years mining companies have been paying increasing attention to the mineral potentialities of the Protectorate. Much of this interest has centred on the known mineral occurrences in the Bamangwato Reserve, which include the Bushman Mine copper deposits some 70 miles north-west of Francistown, the Magogaphate copper-nickel occurrence in the north-east of the Reserve, and the potential coalfields area. African interest in the mineral potentialities of the Reserve is indicated by the fact that the well-known London firm of Mackay & Schnellman

has been employed as consultants by the Bamangwato Tribal Authority.

The chief difficulty facing both the Geological Survey and the mining companies interested in the Protectorate is the fact that 84 per cent of the entire country is buried under Kalahari sand and other formations, so that nearly all prospecting depends on modern scientific methods.

Promising Occurrences

In the Bushman Mine-Phudulooga area to the north of the Bamangwato Reserve, four occurrences of copper mineralization are associated with a regional north trending shear zone, the mineralizations occurring in quartz veins. The shear zone is marked by a vertical band of mylonites and cataclastic rocks, and is associated with a discontinuous belt of dolomitic limestones. A number of "ancient" workings, attributed to a prehistoric people, are found along the shear zone, and European activity centred round the largest of these workings. The mine has been abandoned since 1918.

A preliminary exploration of these occurrences by the Geological Survey proved mineralization along a regional shear zone extending for 15 miles. Geological work is rendered difficult by the lack of outcrops, as the country is very flat and covered with thick "mopani" bush and black turf soil. A detailed geological map has been completed, but the greater part of the work consisted of spontaneous polarization traverses at intervals of 300 ft. to 900 ft. over a total strike of 10 miles. This work has shown the possibility that a number of large lenses of ore of economic grade might be found.

Also regarded as promising is a copper-nickel deposit at Magogaphate, situated in the north-east of the Reserve between the Shashi and Macloustie rivers. Geological mapping in 1932-33 by the Victoria Prospecting Co. revealed three sets of ancient copper workings. A reconnaissance survey by the Geological Survey in 1950 was followed by a self-potential survey at a central group of workings in 1953. The results were sufficiently encouraging to warrant a drilling programme, which led to the discovery of serpentine-carrying nickeliferous pyrrhotite and pentlandite.

There also appears to be encouraging prospects of developments in the coal deposits of this region. The Waterberg Coalfield of the western Transvaal crosses into the Protectorate in the Tuli Block area south of the confluence of the Mahalapye and Limpopo rivers. The coal-bearing Eccia Series (Middle and Upper) are largely covered by other formations, and are revealed mostly in boreholes. The coalfield is cut by a large fault known as the Zoetfontein fault, which runs from the Union. Elsewhere, the Limpopo River, forming the boundary between the Bechuanaland Reserve and the Transvaal, exposes some typical sections of Karroo strata where it cuts across the Waterberg region. A third area under investigation is an extension of the Waterberg field in the Artesia-Debeeti area, where reconnaissance mapping has been undertaken by the Geological Survey.

In the Morapule area west of Palapye, drilling has disclosed a seam of coal which attains 30 ft. in thickness and is of good medium-grade quality. It is believed that two coal basins exist at Palapye.

Other minerals known to occur in the Protectorate include barytes and high-grade iron ore.

Plants as a Guide to Mineral Prospecting

Abstracted from a paper by Donald Carlisle and George B. Cleveland, published by the Division of Mines, Ferry Building, San Francisco 11, as Special Report 50, 1958. Three known molybdenum deposits in California were prospected in the course of the investigation described.

ABURIED ore deposit may provide to the soil above it an abnormal amount of the metal or metals it contains; in turn, the soil may provide a large amount of the same metals to the plant cover. The ore deposit may, therefore, under favourable conditions, be detected by the abnormally high concentration of these metals in the plants, or by the distribution of plants that will or will not tolerate certain metals more readily than others. If the plants are systematically collected and carefully analysed, the results may indicate the possibility of a buried ore deposit. This technique of sampling, analysing, and interpreting the plant cover is called biogeochemical prospecting.

Carlisle and Cleveland point out that at least nineteen factors other than the metal content of the soil may influence the metal content of a plant. If these factors vary within the area of survey, and if they have a significant effect on metal uptake, the biogeochemical results are misleading. Soil moisture and drainage influence the availability of some metals, although, in general, the influence of the physical properties of soil is probably not great. Even the amount of sunlight and shade has a slight effect for some plants. The largest effects, however, are associated with the chemical properties of the soil, both as an influence on the metabolism of plants and as a control of the state of the metal in the soil, since most of the metal in the soil is present not in minerals or in solution, but as ions, sorbed or exchanged in the soil materials, especially on clay minerals and organic matter, or else as complex ions.

Consequently, the ability of the plant to absorb metals is liable to be profoundly influenced by the kind and concentration of exchange materials, by the soil pH, by the kind and concentration of other ions, and by organic materials and micro-organisms. The exchange capacity of a soil also largely determines the amount of metal that will be taken and retained from various sources. Available data suggest that the clay or organic content of a soil can be responsible for variations of a few-fold in the metal content of that soil.

At least seven of the factors discussed in the report are shown to be controlling factors. These seven are summarized as: soil pH, exchange material, other ions, plant type, age of plant and organ, translocation, and season.

The field studies described provided a means for testing some of these factors. Made at three known molybdenum deposits in California, where, as nearly as possible, four of the seven controlling factors were constant, they showed that the anomaly detected was due primarily to the high molybdenum concentration in the soil. It was, therefore, a direct reflection of the underlying ore zone, or was closely related to it. Additional proof that the underlying ore deposit was the responsible factor was provided by soil analyses made from samples taken at the Bour molyb-

denum mine, which showed that the concentration of molybdenum in the soil fluctuated in the same manner as the concentration of molybdenum in the plants, providing nearly identical anomalies. The overall concentration in the soil, however, was lower than in the plants, showing that the plants were a more sensitive prospecting instrument.

Data collected at the Cosumnes mine showed considerable variation in soil pH and soil ions, which may have been due to the presence of three underlying rock types. However, this factor had little apparent influence on the metal content of the plants, since the highest molybdenum values were recorded from soils with the lowest pH. Molybdenum concentration increased as the ore zone was approached, except at one station, where there was some evidence that the suppressing effect of CO_3 and HCO_3 ions, derived from the underlying limestone, reduced the uptake of molybdenum. As at the Bour mine, the high concentration of molybdenum in the soil had a greater effect on the metal concentration in the plants than did the other controlling factors.

More than half of the plant samples collected at the Tyler Creek tungsten mine showed no anomalous concentration of molybdenum, and there was no uniform concentration pattern related to the ore zone. The data pointed to the underlying rock type as a principal influence in regulating the soil pH; therefore the rock type might be expected to have some influence on molybdenum concentration in plants. Unfortunately, the data obtained by the investigators are insufficient to demonstrate such an influence conclusively. Nevertheless, it will probably be necessary in future investigations to apply a correction factor when traversing from one rock type to another.

The anomalous molybdenum content of the plants was considerably lower in the Tyler Creek mine than at the other two mine areas studied. This may have been due, in part, to the molybdenum concentration in the soil, although, in view of the rather erratic results obtained, it was considered likely that the plant type sampled, or the high concentration of CO_3 and HCO_3 ions in the soil at certain stations, might have reduced the assimilation of molybdenum by the plant. This area thus illustrates to a limited degree how the other factors can obscure and disperse a biogeochemical anomaly. The fact that most of the plant samples show a greater than normal molybdenum concentration is evidence that the soil molybdenum concentration is still the principal controlling factor in this area.

It is recommended that future work in biogeochemistry should be directed towards the accumulation of data on plant-metal-soil relationships for all the economic metals. The character of the metal as it is related to the soil chemistry and to the geology appears more vital than the influence exerted by the plant. It is true that certain physiological features of plants exert a significant influence in biogeochemistry, but, on the whole, all plants react with a certain degree of consistency. The behaviour of molybdenum is not yet completely understood, and there is a real need to extend the studies begun in this investigation.

The authors consider that the influence of all the important rock types on molybdenum anomalies would be of interest, as would the effect of a wider range in soil pH. More study should be given to the geological controls. Molybdenum-plant relationships in the vicinity of ore deposits should also be tested under a greater range of climatic conditions.

MINING MISCELLANY

The Ministry of Economic Affairs for Formosa plans mineral exploration for deposits of oil, copper, iron, manganese, gold, silver, and pyrites.

One of the most important items of Poland's geological plan for 1959 is the investigation of hard-coal deposits, situated mainly in the region of the Upper Silesian coal basin. The work carried out this year has in view the preparation of new minefields, chiefly coking coal collieries. Prospecting for copper will be concerned with a further study of the deposits in Lower Silesia and their classification, but operations will also be carried out north-west and south-east of the already discovered deposits. Intensive prospecting work for iron ore will be undertaken in the north-western regions of Poland. Polish geologists will also search for barytes, rock salt, and potassium-magnesium salts, quartzites, lead-zinc ores, and other raw materials.

A report from Plovdiv states that work has started on the construction of a new lead-zinc plant between Plovdiv and Asenovgrad, in the foothills of the Rhodope mountains in Bulgaria. The construction is to be carried out in two stages, during the first of which will be completed a zinc section with an annual capacity of 30,000 tonnes of zinc, and a sulphuric acid section with an annual capacity of 60,000 tonnes. The former of these will differ from that already in operation at Kerdzhali, in being able to refine even residual ore. The second stage will be the completion of a lead section, which will refine out cadmium also, in addition to cobalt, bismuth, silver, and other metals.

Deposits of coal, placer gold, manganese and pyrites ores have been discovered in Formosa in the mountains along the east-west Cross-Island Highway.

At a luncheon given under the auspices of *The Corrosion Engineer* at the Rembrandt Hotel, South Kensington, on May 29, 1959, Mr. H. M. Powell, who is technical director of Cathodic Corrosion Control Ltd. and chief electrical engineer of the Constructors John Brown organization, announced the formation of the British Association of Corrosion Engineers. The objects of the association will be generally to promote the dissemination of technical information about corrosion matters and to develop by means of social activities the free interchange of information among members. In due course, the association will progress towards the establishment and acceptance of suitable qualifications for corrosion engineers, and the promotion of standardization in the terminology and techniques of corrosion control. Full details and membership application forms can be obtained from the hon. secretary, British Association of Corrosion Engineers, 97 Old Brompton Road, London, S.W.7.

The Russian technical news agency reports that a newly discovered iron ore deposit near Belgorod contains an estimated 12,000,000,000 tonnes of iron ore.

This deposit would be five times as large as the largest exploited deposits in the Soviet Union, those of the Krivoi Rog. The deposit is of metamorphosed magnetite, which consists in the best sites of 61 per cent iron, 5 per cent silicon, and 0.02 per cent phosphorus. By 1966 it is planned to obtain between 30,000,000 and 35,000,000 tonnes of ore from these reserves per year.

A Vietnamese news agency report from Hanoi announces the completion of two new phosphate plants, with an aggregate annual output of about 13,000 tons in the Republic of Vietnam. They are adjacent respectively to the phosphate mines at Vinh Tinh, in the mountainous province of Lan Son, and Ham Rong in the province of Thanh Hoa, in north central Vietnam.

Old copper mines on Ross Island, Killarney, were visited recently by Mr. P. E. Auger, a Canadian geologist, who was accompanied by an official of the Eire Geological Department. Some time ago it was announced that survey work on this site had ceased. The copper mines on Ross Island were last worked commercially in 1804, when ore valued at about £80,000 was mined there. Flooding in the mines by lake water ended the venture. The property is owned by a group of Americans who purchased a portion of the Killarney Estate a few years ago.

The thirty-two graduates of the Technological Institute of Rimouski, a town 200 miles east of Quebec in Canada, did not have to wait long for employment. The entire graduation class was hired by an iron ore mining firm operating in Ungava.

Automation has enabled a Soviet copper mine at Degtyarsk, in the Urals, to reduce its labour force by 250 to 300 miners. In this mine, the water disposal system has been automated, and full mechanization of the underground transport system is well advanced. Loading and unloading operations are also automated and regulated by remote control.

Cartier Quebec Explorations have signed a diamond drilling contract for their ground in Cavellier Township in the Mattagami area of Quebec. The drilling, which will start immediately after break-up, will test an electromagnetic conductor striking east-west, in the south-west part of the property. Exploration of two other properties is planned for the coming season.

Preliminary investigations have indicated the presence of lignite deposits amounting to 200,000,000 tons in the Megalopolis area of Central Peloponnisos, according to the Greek Industry Minister, Mr. Nikolaos Martis. The Public Power Corporation is to call bids for further investigations and exploitation of the deposits. Only German firms will be allowed to apply, as German credits are involved.

At Andamooka opal fields in Australia, a matrix of opal-containing rock,

with an opal showing in spots and seams has been found. According to Mr. Warwick, managing director of Andamooka Enterprises, the matrix weighs about 2.195 troy oz. Although the company will give no estimate of the value of the stone until it has been cut in Adelaide, it is believed that the stone is much larger than one sent to America recently, which was valued at \$2,000,000.

Fukoku Oil Co. of Japan plans the production of elemental boron from an unusual source. Underground water in the natural gas fields of Niigata Prefecture has an unusually high boron content, which it is proposed to extract by an ion exchange process.

A survey of the talc-magnesite rock of Pathar Pahar, and in the Singbhum District of Bihar, has established the existence of over 6,000,000 tons of the material to a depth of 50 ft. This combination of talc and magnesite, which can be used in the manufacture of firebricks, is similar in chemical and mineral composition to that of the Sudan.

A geologist from a United Kingdom firm arrived in North Borneo recently to investigate the prospects of mining chromite on a commercial scale. It is understood that he will also prospect for other minerals at the same time. This visit follows several discoveries of mineral deposits by government geologists during the past few years. Reports have been received that North Borneo is to intensify its search for copper, and a research student with specialized training in geochemical prospecting has recently arrived from the Royal School of Mines in London. It is understood that he will be mainly concerned with searching for copper, but at the same time will also make certain investigations into chromite deposits.

Large deposits of iron ore have been discovered on the slopes of Zlatibor and in the Mokragora Valley, Yugoslavia. Estimated at several hundred million tons, the ore belt is 32 km. long. The ore found at Zlatibor contains a certain percentage of nickel.

PERSONAL

Mr. W. Roy Dunbar, P.Eng., a consulting mining engineer of Toronto, Canada, recently visited the Allibies copper mining area in County Cork, Ireland.

Mr. H. G. W. Chichester-Miles, chairman of the Empire Rubber Company and of Rubber Bonders Ltd., has been elected president of the Federation of British Rubber and Allied Manufacturers for 1959 to 1960. Vice-presidents for the same term are Mr. S. D. Sutton, of Veedip Ltd., and Mr. C. H. M. Baker, of the Firestone Tyre and Rubber Co. Ltd.

Mr. T. R. Earnshaw, who was recently appointed a director of Ferodo Ltd., has assumed full responsibility for export sales on the retirement of Mr. F. L.

Harrap, his predecessor as export sales director.

The 1959 John Morris Memorial Award made by the British Industrial Truck Association has been won by Mr. G. Downie, who is executive officer, Materials Handling, Unilever Ltd. The award is in the form of a scholarship which provides for an intensive course of study at the 6th Annual Materials Handling Training Centre at Lake Placid, New York, U.S.A., this year.

Mr. G. S. Parish has been appointed sales manager, London area, of the David Brown Corporation (Sales) Ltd.

The North British Rubber Co. announce the appointment of Mr. T. S. Martin to the newly created post of field sales manager, Industrial Products Division.

The Minister of Power has appointed Mr. C. Leigh, M.I.Min.E., H.M. Senior District Inspector of Mines and Quarries in South Wales, to be H.M. Divisional Inspector of Mines and Quarries for the South-Western Division with headquarters at Cardiff.

Mr. F. McPherson and Mr. J. K. W. MacVicar have been appointed joint managing directors of Thermotank Ltd., air-conditioning engineers, Govan, Glasgow.

Mr. J. M. Moody and Mr. E. S. Bedell have been appointed directors of Seremban Ltd. with effect from June 2, 1959. Mr. J. E. Wickett has resigned the office of secretary of the company, and Mr. G. S. Stonier has been appointed secretary. Major W. E. Hosking and Mr. S. Wickett have resigned as directors of the company.

Mr. D. H. Hill, of the U.K. Atomic Energy Authority, has been appointed Resident Nuclear Energy Attaché to Mr. A. H. Tandy, the U.K. Government's Representative to the European Atomic Energy Community (EURATOM) in Brussels.

Mr. R. G. Baker, C.B.E., has been elected president of the Institution of Mining Engineers for the year 1960-61, and will succeed Mr. T. A. Rogers, C.B.E., at the 66th annual general meeting of the Institution to be held in London on January 28, 1960.

Mr. J. T. Chappel, C.B.E., M.I.M.M., has been appointed a director of Pengkalen Ltd. and Rambutan Ltd.

The three presidents of the executives of the European Communities, Mr. Hallstein (Common Market), Mr. Hirsch (Euratom), and Mr. Finet (European Coal and Steel Community), are to pay an official visit to Ottawa, at the invitation of the Canadian Government, on June 22 to 23, at the conclusion of their North American tour.

Mr. B. A. Christie has joined I.T.D. Ltd., of Hall Green, Birmingham, and will take up the appointment of managing director of that company on June 17, 1959.

Miss W. Nuttall and Mr. J. Hunt have both been appointed directors of R. Hostombe Ltd. Mr. P. Skinner, F.C.I.S., has been appointed secretary of the company.

Company News

A larger factory, including an office block, has been acquired by Causeway Reinforcement Ltd., a member of the Amber Group of Companies. This move has been made necessary by the expansion of trade in the special field in which the company operates. The range of goods now produced includes surface armouring for refractory linings, industrial linings, industrial floors, general floors, roads, ships' decks, and mines. Technical development and research facilities are available to meet special inquiries.

Messrs. Parkinson Howard Ltd., in association with Sir Lindsay Parkinson and Co. Ltd. and John Howard and Co. Ltd., have been awarded the contract for the access roads for the Volta River Project preliminary works. The contract consists of the construction of two miles of road widening, nine miles of new road to trunk road standards, three miles of housing layout, and four miles of dam site construction roads. The employing authority is Kaiser Engineers and Contractors Inc., and the consulting engineers are Sir William Halcrow and Partners. The value of the contract is £420,000 and the work will be completed within nine months. Parkinson Howard Ltd. are at present constructing the £12,500,000 Tema Harbour, Ghana, which is now nearing completion. This will be the largest artificial harbour in Africa.

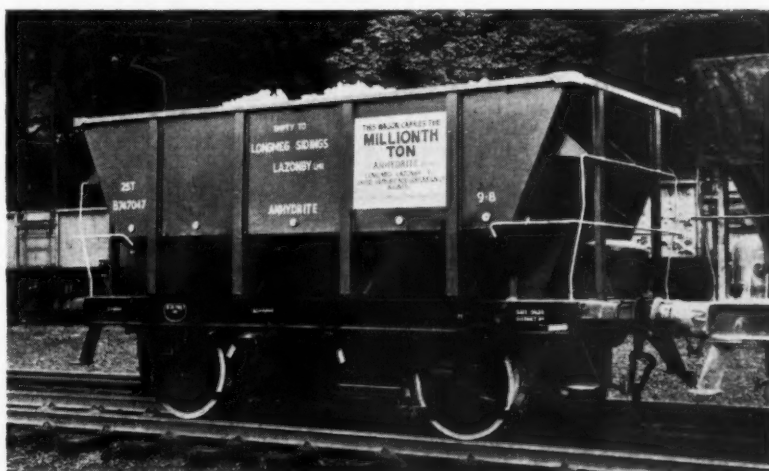
The mining company Sal y Yeso C. por A. is completing a \$5,000,000 mechanization plan for its gypsum deposits near Barahona, in the Dominican Republic. These will consist of large capacity conveyor belts, road and railway and bulk loading installations and piers at Barahona. The president of the firm states that although gypsum is widely held to be an uneconomic mineral for extraction, this mechanization will greatly increase its profitability. The new transport system will come into operation in August, and will employ three 22-ton Euclid conveyors and forty railway wagons of 30 tons capacity.

Turkish Gulf Oil Co. is undertaking airborne magnetometer surveys in Turkey over the Tuz Golu and Thrace areas. It is the first airborne geophysical study ever made in Turkey. The survey is being performed by Canadian Aero Service Ltd., an international air survey company with headquarters in Ottawa. Base for the survey is Ankara. The survey aircraft is an Anson Mark I, and the Gulf high sensitivity magnetometer is the survey instrument. A Gulf ground monitoring station will watch for magnetic storms.

The chairman of Pennarroya, a French non-ferrous mining company, has said that the company has now become a copper producer with the absorption of the Compagnie Minière de M'Zaita, which operates mines in Chile. He added that the company was building a modern zinc refining mill.

An order has been placed with E.M.I. Electronics Ltd. for what is believed will be the first television system to go into operation in the new West African republic of Ghana. The system will be used at Ashanti Goldfields Corporation as an added security measure to guard against pilfering and the unauthorized processing of gold ore. Three cameras are being mounted at vantage points to scan the working area, and relay pictures to receivers placed in the offices of senior security officers. The system is so arranged that monitors can be switched to receive pictures from any one of the three cameras. The entire system can be controlled from a central point, thus eliminating the need to enter the restricted areas to make adjustments to cameras. In this way a more effective security check can be maintained on the mine's highly valuable stock than would be possible by other methods. Coaxial cable will carry signals over a distance of some 4,000 ft. from the processing area to the security offices without loss of picture quality. The system has been designed so that it can be extended at any time to include more cameras or receivers.

The wagon which carried the millionth ton of anhydrite from the Long Meg Mine, near Penrith, to United Sulphuric Acid Corporation, Widnes, recently. This figure represents the output of the mine in the last four years and achieves the target of 250,000 tons a year, which was set when the development project was started



Machinery and Equipment

New Mining Pump

Specially developed for face drainage and general underground work, the Pegson Marlow "2" Type 2FI/1 self-priming centrifugal pump will work virtually anywhere in the mine—even on an inclined plane. It will deliver up to 90 g.p.m. and will work against a static suction lift of 25 ft. with a maximum head of 125 ft. passing solids of $\frac{1}{8}$ in. size. Materials are available to withstand those waters containing corrosive acids.

Incorporating the Pegson Marlow patented diffuser feature, which assures self-priming without liquid recirculation or auxiliary mechanisms, the pump has relatively large clearances to ensure that full priming efficiency is maintained even when excessive abrasion is encountered; and the impeller and diffuser, which are cheap to replace after long hard use, are the only two parts subject to abrasive wear. There are no internal valves, no pressure relief valves and no foot valves required and the simple but practical design eliminates clogging or jamming.

A soft-packed stuffing box, alternatively a mechanical shaft seal, prevents air being drawn into the pump even on the highest suction lifts and oil seals safeguard the grease lubricated taper roller bearings against dust and grit. The pump shaft which is protected by a sleeve is of ample proportions for horsepower and all duty conditions and is not subject to hydraulic bending loads. The pump can be supplied with or without power unit; in the former case a Buxton certified flameproof motor is fitted.

Arrangements have been made with the National Coal Board for a number of these mining pumps to be subjected to extensive tests at collieries in Scotland, N.E. England and Lancashire.

NEW MUFULIRA FAN

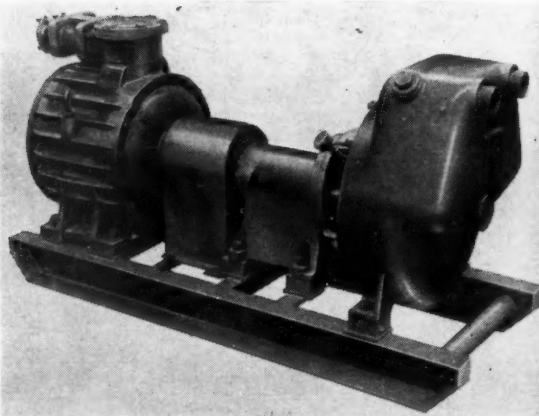
Recently, a large new ventilation fan was commissioned at No. 10 Shaft, Mufulira Mines. The installation, manufactured by the South African Fan Co. in conjunction with the James Howden Co. of England, has been described in *Horizon*.

It was necessary to commission the fan—it has a capacity of 500,000 cu. ft. of air a minute—without interfering with normal mining operations. This meant that the final details had to be left for completion on a Sunday, when the return airway network in the No. 8 shaft district had to be substantially enlarged. This entailed the demolition of certain underground walls.

No. 10 is an upcast shaft ventilating the western side of Mufulira and the eastern side of Mufulira West. At the shaft, on surface, are now installed two Safanco single-stage adjustable pitch fans. The capacity of each is 500,000 c.f.m. and when both fans are eventually operating in parallel their combined capacity will be 1,000,000 c.f.m.

Only one of these fans was commissioned on March 1. The other will be brought into operation when Mufulira West is further advanced—when Nos. 11, 12 and 14 Shafts are holed into the mine

The Pegson Marlow 2-in. 2FI/1 self-priming centrifugal pump



and are available as downcast airways, and when stoping operations have been started in the Mufulira West section of the mine. The holing from No. 12 Shaft is expected to be achieved late in May this year, when cool air will downcast into the western extension and further improve ventilation conditions during the initial development stages there while only one fan is in operation at No. 10 Shaft.

It may, however, be decided to operate both fans at reduced capacity before Mufulira West is in full production: the blades of the fans may be set to achieve an upcast air flow of about 750,000 c.f.m.

When No. 10 Shaft was commissioned as an upcast airway it became possible to stop two fans. They were operating in small, closely zoned districts which have now been incorporated in the No. 8 and 10 Shaft circuits.) Ventilation conditions underground have been improved, particularly west of 26 Block—roughly at the boundary of the caving mining area and the open stoping area, nearly a mile east of No. 10 Shaft—and will improve further when adjustments to air distribution are made.

With the closing down of the two small fans and the commissioning of No. 10 Shaft, the total upcast volume from the mine has been raised from 1,400,000 to 1,660,000 c.f.m. Together with the commissioning of No. 10 Shaft as an upcast airway, No. 2 Shaft fan on the 900 level (capacity 200,000 c.f.m.) was commissioned as a booster, its circuit being brought into the No. 8 Shaft return airway system where a giant fan of 1,000,000 c.f.m. is in use.

Ultimately, when Mufulira West is in full production, No. 13 Shaft (now sinking) will be an upcast airway having fans capable of handling 330,000 c.f.m. The total air volume upcast from the mine will then be 2,330,000 c.f.m.—the equivalent of 73.5 tons of air circulating through the mine every minute.

FLAMEPROOF ELECTRIC MOTORS

Flameproof electric motors, for use in mines with equipment such as conveyors, coal-cutters and loaders, are the subject of revised British Standard 741:1959. The scope of the standard covers constructional requirements, by reference to B.S. 229, "Flameproof enclosure of electrical apparatus"; and requirements of electrical performance. The latter includes limits of permissible tempera-

ture rise; performance under momentary overloads and at high voltage; and other requirements.

RESEARCH IN POWER PLANTS

The U.S. Bureau of Mines is preparing to conduct research and development to establish the feasibility of the coal-burning gas turbine for power generation in stationary plants. Coal-fired gas turbine plants for motive power use have been the object of more than twelve years of detailed study by Bituminous Coal Research, Inc., and all of this work is available to the Bureau of Mines, who will proceed to adapt it to applications in stationary plants.

BCR has produced solutions to three basic problems which existed at the beginning of its project: (a) feeding coal to the combustion chamber at elevated pressures; (b) burning coal at high temperatures and pressures; and (c) ash control and elimination. The Bureau will seek even better fly ash control than has already been developed, and will work toward improving the design of turbine blades and developing better materials of construction.

By eliminating the need to develop steam for driving turbines, this research becomes particularly attractive for producing cheap power in western arid regions and in similar areas of the world.

A DIAMOND DRILL

Claimed to be the fastest-drilling air-powered diamond drill in its class, the newly-available CP-65, made by Consolidated Pneumatic Tool Co., incorporates a reversible motor for rapid screwing and unscrewing of rod joints. Suitable for both core and blast hole drilling, the machine's capacity is stated by the makers to be 600 ft. using EW rods and EX fittings.

The complete drill with its built-in swivel head is 42½ in. long and weighs 200 lb. Ball bearings are used throughout the drill and its spur gear drive has all parts running in grease or oil to reduce wear and friction losses. The high-torque rotary air-motor operates at normal mine pressures and is fitted with a stepless throttle control. A self-lubricating feed screw gives a 24-in. run. Four feed gears are fitted.

The drill mounts on a standard rock drill saddle and works in any position. It swings out of the way for rod pulling.

Metals and Minerals

Difficulties of the Indian Manganese Industry

The U.S./Indian barter deal involving surplus U.S. farm products for Indian manganese ore and ferro-manganese is reported to be slow in getting under way. There were rumours to the effect that invitations to bid on this ore would soon be under way, but so far nothing tangible has materialized. It is believed India is claiming that she cannot deliver the 150,000 tons of low grade ore included in the deal within the time stipulated by the U.S.

The tendency for Indian prices f.o.b. New York to be shaded at times has been completely offset by the freight rate, which was recently raised by 5s. to 62s. 6d. per ton. A further restraining influence has been the possibility of a strike in the U.S. steel industry.

The proposal to levy a cess on exports of manganese and iron ores for promoting labour welfare has been shelved by the Indian Government, which seems at last to have realized the difficulties and problems facing exporters. Many mines are reported to be lying idle as a result of dwindling export markets. The State Trading Corporation has not succeeded in finding buyers for the ores purchased from the mines in 1956 and it is said to have sustained a huge loss on that account. The industry is further handicapped by uneconomic working costs.

The latest reports from Bombay state that the Federation of Indian Chambers of Commerce and Industry has requested the government to cut existing royalties and freight rates on manganese ore so that the price of the exported ore may be reduced by £3 or more per ton, f.o.b. shipping port. The Federation further recommends that the State Trading Corporation should no longer be required to act as the canalizing channel for the trade.

There are still no indications of any worthwhile pick up in the demand for manganese ore. Most consuming countries appear to be adequately covered under existing contracts, with the result that interest in marginal tonnages still remains small. U.K. intake of ore continues to match requirements and stocks, which are mainly of high grade material. In New York it was reported that one consumer had recently purchased some 7,000 tons of low grade ore and that there had been a few enquiries for other small amounts.

At the annual meeting of the Manganese Ore Co. Ltd., the chairman, Major A. C. Herring, expressed the view that the demand for manganese was not likely to increase much until consumers' stocks had been reduced, which would probably take some considerable time.

Continental Ore Corporation has signed a contract with Cambatta Ferro-Manganese Ltd. (Bombay) to purchase 30 tons of ferro-manganese yearly until the end of 1964. This U.S. company also has an agreement with Khandelwal Ferro Alloys Ltd., of Bombay, to purchase its entire annual output of 30,000 tons of ferro-manganese.

LONDON QUICKSILVER MARKET

The recent slight downward adjustment in the London ex-warehouse quicksilver price, to £77 per flask from £77 10s. previously, reflects no significant change in the spot position, although rather more metal is reported to be available, including Mexican.

Imports of quicksilver into the U.K. during January-April totalled about 7,000 flasks, compared with about 5,600 flasks during the corresponding period last year. Exports over the same two periods were respectively 1,238 and 1,460 flasks.

PHILIPPINE NICKEL PROJECT

A report on the extent and commercial value of the large nickel-iron ore deposits on Nanoc Island off Surigao has been issued, following a detailed survey by officials of the Philippine Bureau of Mines and Mr. W. S. Wright of the U.S. International Co-operation Administration.

A major portion of the report is devoted to consideration of a plant for treating the ores according to a new process worked out in co-operation with the U.S. Bureau of Mines. The type of plant recommended would treat initially 2,000 tons of ore a day, an amount to be increased gradually to 6,000 tons. Cost of the plant would be in the neighbourhood of 105,000,000 pesos, half of which would have to be in foreign exchange (5.62 pesos=£1). The estimated total cost of processing the ores would be around 68 pesos per ton. The estimated market value of recovered nickel, cobalt and steel would be around 86 pesos per ton.

The indicated profit margin, it is considered, should encourage foreign investors to look favourably upon developing the reserves when bidding for the concession is re-opened shortly by the Philippine Government.

Test pitting and auger drilling at 100-m. intervals, over a 2,500 hectare portion of this area, embracing the laterites of Nonoc, Awasan and Southern Dinagat islands, showed that 97 per cent of the penetrated material contained enough iron, nickel and cobalt to warrant exploitation.

Estimated ore reserves classified according to grade, are reported to be as follows:

- (1) Iron ore—104,000,000 tonnes containing 47.55 per cent iron and 0.79 per cent nickel;
- (2) Iron-nickel ore—26,000,000 tonnes containing 43.36 per cent iron and 1.48 per cent nickel;
- (3) Nickel ore—13,000,000 tonnes containing 14.91 per cent iron and 1.70 per cent nickel.

Pyrometallurgical tests by the U.S. Bureau of Mines on 300 tons of typical Nonoc ore, show that by controlled carbothermic reduction in electric furnaces a 90 per cent recovery of nickel and an

80 per cent recovery of cobalt can be expected from all ores, and that 80 per cent of the iron in "iron ore" and "iron-nickel ore" can be recovered and processed into low-alloy mild steel of commercial grade. Recoverable iron amounts to 48,500,000 tonnes, recoverable nickel to 1,412,000,000 s.tons, and recoverable cobalt to 99,000 s.tons.

CAESIUM ENGINES

Executives of General Electric recently made optimistic predictions on ionic propulsion at a meeting of the American Rocket Society. Caesium may also be utilized in new devices for the direct conversion of heat to electricity.

In the caesium engine, metal is vaporized in a boiler and then diffused through a special heated plate of porous tungsten. During the operation caesium atoms become charged ions through the capture of electrons by the tungsten. The positive ions are then directed into a high velocity stream by an electric field. This powerful stream makes egress through an orifice which might be likened to a rocket nozzle.

Ionic engines, it was stated, might be ready for practical use in 1965. Test flights could be expected in 1961. The advantages include weight saving, ease of control, and better adaptability for space vehicles.

The engine requires a fuel that is easily ionized and has heavy ions. Caesium and rubidium provide heavier ions than the other alkali metals.

Caesium has been used as a "getter" in tubes, in photoelectric cells, and in atomic work, but little market information is available regarding the metal and its compounds. The metal probably sells in the U.S. for about \$5 or less per gram and 25 per cent ore probably at about \$1.00 per lb. American Potash and Chemical Corporation is one of the leading U.S. companies working with caesium material.

As a result of growing interest in caesium, prospectors are now searching for the principal mineral, pollucite, good deposits of which are known in Maine, Manitoba and Rhodesia.

INCREASED ALUMINIUM OUTPUTS

Last week we reported that, due to the rising demand, Kaiser Aluminium planned to increase its production of primary aluminium. It has since been announced that Alcoa is stepping up its primary aluminium output by an additional point, bringing it to 83 per cent of rated annual capacity, and that Reynolds Metals plans to raise its output to 100 per cent of capacity, namely 601,000 tons. Early in May, Reynolds announced a rise to 93 per cent of capacity from 89 per cent.

Mr. Nathaniel V. Davis, president of Aluminium Ltd., states that his own

company is beginning to emerge from 1958's doldrums. Second quarter shipments this year are expected to be about 25 per cent greater than in the first quarter of 1959 and about equal to the second quarter of 1958, when the company's sales to other producers were substantial.

North American producers believe that the present strength of demand stems from higher consumption more than from efforts to obtain protection against possible work stoppages, though these industries have certainly contributed to the continuing improvement. It appears to be the general expectation that some increase in prices will take place after June 30, when the industry's voluntary price freeze expires. Mr. Davis is of the opinion, however, that the continuing excess of pig and ingot supply can hardly be expected to exert any upward pressure on prices at the present time. On the other hand, demand for semi-fabricated products is strong, and current fabricated prices in many items provide small incentive to the fabricator as such. On economic grounds, there is thus stronger support at present for an upward movement of prices at the fabricating level than at the primary level. Normally, any rise in wage costs would, of course, be expected to result in higher prices, in which connection it may be noted that wage contracts in the U.S. aluminium industry do not expire until the end of July, a month after the steel pacts.

Indicative of the industry's strengthening position was Kaiser's move—already

followed by Reynolds Metals—to eliminate discounts on domestic shipments by selling its aluminium on a delivered basis rather than the current f.o.b. shipping point basis. The changeover becomes effective on July 1.

TURKISH CHROME EXPORTS

It is reported from Istanbul that sales of chromite from Turkey are not developing as well as had been anticipated, following the announcement of a higher dollar export premium. Advices from the U.S. indicate that stocks in that country are quite substantial and that lower prices are insufficient incentive to bring about sizeable deals.

U.S. CADMIUM INDUSTRY

Primary and secondary cadmium metal production in the U.S. during the first quarter of 1959 totalled 1,335 s.tons, being about 1 per cent higher than in the fourth quarter of last year and 9 per cent above the first quarter of last year. Shipments of cadmium metal by producers, including internal plant consumption, were down 3 per cent from the fourth quarter of 1958, but were 36 per cent higher than in the first quarter of the same year. Stocks increased by 6 per cent to 2,970 s.tons on March 31, 1959. Metal producers' stocks increased 5 per cent, compound producers' stocks were up by 127 per cent, but distributors' stocks declined 12 per cent. General imports of metal fell during the quarter by 23 per cent to 24 s.tons.

the threatened United States steel strike hangs over the market and a prolonged stoppage could have an adverse effect. Once this uncertainty is removed there seems little doubt that higher levels will be attained.

United States figures for the month of March are satisfactory in that consumption at 7,510 tons is the highest since April, 1957, and total stocks decreased during the month some 200 tons to 36,300 tons. United Kingdom stocks showed an increase of 112 tons last week to 7,776 tons.

On Thursday morning, the Eastern price was equivalent to £818½ per ton c.i.f. Europe.

LEAD-ZINC PRICES EASE

Demand for lead and zinc has been quieter this week, and with the possibility of the early arrival of metal in the United Kingdom, the nearby quotations in each case have turned easier. However, particularly in the case of zinc, the undertone of the market is good and there is still a strong opinion that the United States price could be raised but for the reasons we have previously considered.

Total pig lead production in O.E.E.C. countries in April increased to 51,563 tonnes compared with 46,681 tonnes in March. In the United States, new supplies of lead came to 105,700 tons in March, whilst 85,100 tons were consumed compared to 84,200 tons in February, and stocks in the hands of consumers and secondary smelters increased some 10,000 tons during the month.

Zinc production in O.E.E.C. countries totalled 72,216 tonnes in April compared with 75,297 tonnes in March. In the United States consumption during March showed an improvement at 86,300 tons, which is the highest for any month since October, 1957. Smelter production rose 8,700 tons to 79,900 tons during the month and smelter stocks increased nearly 6,000 tons.

Figures issued during the week show that United States domestic zinc production in May at 77,489 tons showed an increase compared to April's figure of 76,393 tons, and domestic shipments increased to 85,073 tons compared to 78,358 tons, and stocks declined to 196,004 tons at the end of the month compared to 203,863 tons a month earlier.

Closing prices up to midday, June 11, are as follows:

	June 4		June 11	
	Buyers	Sellers	Buyers	Sellers
COPPER				
Cash ..	£240½	£240½	£234	£234½
Three months ..	£239	£239½	£233	£233½
Settlement ..	£240½		£234½	
Week's turnover	7,925 tons		11,700 tons	
LEAD				
Current ½ month	£69½	£70	£68½	£68½
Three months ..	£71½	£71½	£70½	£70½
Week's turnover	7,350 tons		6,775 tons	
TIN				
Cash ..	£787½	£788	£786½	£787
Three months ..	£790	£790½	£786½	£787
Settlement ..	£788		£787	
Week's turnover	1,295 tons		1,155 tons	
ZINC				
Current ½ month	£77½	£77½	£77	£77½
Three months ..	£76½	£76½	£76½	£76½
Week's turnover	4,700 tons		3,700 tons	

London metal and ore prices appear on inside back cover.

COPPER • TIN • LEAD • ZINC

(From Our London Metal Exchange Correspondent)

The main points of interest during the week have been the further decline in copper prices, whilst tin values have made substantial headway. Business in lead and zinc has been of a routine nature and price movements negligible.

SENSITIVE COPPER MARKET

The London copper market continues to be very sensitive to daily movements in the United States, and at the end of last week interest switched from the labour negotiations to the possibility of stockpile metal being released. Rumours to the effect that an early and important new policy statement would be issued in Washington originated in London, but were promptly and emphatically denied by the O.C.D.M. But the fact cannot be overlooked that these reports have had a considerable influence on the market just at the time when talks between the union and the producers are entering a critical stage, with both sides expected to take a firm stand. Nevertheless, they had an instant effect on the New York Commodity Exchange, where, in active trading, values have declined sharply following substantial selling, mainly of a stop-loss nature.

The London market has reflected this downward trend in movements which, generally speaking, have occurred in the afternoon market, thereby indicating that there is a certain amount of arbitrage business between New York and London. Inevitably, the movements in London have come in for a certain

amount of criticism on the grounds that the New York activity is largely of a speculative nature, and that the market here should not be so susceptible to these as has been the case.

Overall, the outlook for copper for the second half of the year is still to a great extent dependent on whether or not a strike in the United States takes place. Producers' stocks over there are now standing at approximately a three-week level, whilst those outside the United States are nearly twice what they were at the beginning of the year. As far as Europe is concerned, with demand quiet, there is little to indicate an early change in the situation.

In the United States, with both producers and customs smelters sold out for June, demand for nearby copper has turned quieter, although during the week there have been reports of isolated cases of fabricators having paid over 33 c. for imported metal. Latterly, however, producers have started selling for July delivery and find demand satisfactory. The scrap copper market has turned easier with a reduction of ½ c. to 26½ c. for No. 2 wire. United Kingdom stocks at the end of last week showed an increase of 414 tons to 13,312 tons.

TIN GOES AHEAD

Recent good buying of tin has reflected the satisfactory statistical position of the metal, and prices have risen to the highest so far in the present upward movement. It must be remembered that

Mining Finance

Mr. Engelhard Looks At Gold

Mr. Charles W. Engelhard, chairman of Rand Mines, has devoted much of his maiden statement to his views on the outlook for gold. Coming so soon after Mr. Bernstein's forthright article, which poured some very cold water on the prospects for an increase in the metal price, Mr. Engelhard's opinions form a powerful anti-depressant.

Surprisingly, Mr. Engelhard is fundamentally in agreement with Mr. Bernstein. The case for an increase in the gold price, he feels, cannot rest exclusively on the weakness of the dollar. In any case, in spite of increasing pressure from abroad, there is no evidence of an actual flight from the dollar. This, of course, was Mr. Bernstein's main point.

Mr. Bernstein, however, was concerned exclusively with a discussion of the strength of the dollar, and he introduced the gold price controversy as nothing more than an Aunt Sally to be knocked down by his earlier arguments. An increase in the gold price in the interests of world liquidity was outside his field of discussion. Mr. Engelhard, on the other hand, believes this to be the most cogent argument. He is not alone.

In any event, it means very little to say, as Mr. Bernstein did, that Congress would never sanction dearer gold except in a real emergency. This, regrettably, is probably true, and it almost certainly follows that when the price is raised the decision will have been taken quickly, arbitrarily and in a panic, followed by some weeks of currency confusion. This is obviously a far inferior course to the alternative of a planned and well-timed increase made before the U.S. situation becomes really pressing.

Mr. Engelhard also expressed his opinions on the future of uranium and on the prospects for the South African economy. Extracts from his speech will be found on p. 661.

CONSOLIDATED TIN MINES TO LIQUIDATE

In August last year, Consolidated Tin Mines of Burma asked the Ministry of Mines in Rangoon what possibilities existed of forming a joint venture with the government or of making other arrangements for the satisfactory exploitation of its properties. The letter pointed out that unless some such arrangement could be made, the company would have to consider voluntary liquidation. The subsequent negotiations proved abortive, and the company has therefore called an extraordinary meeting for June 29 at which proposals for liquidation will be considered.

At the date of the last balance sheet (June 30, 1958), Consolidated Tin Mines' liquid assets stood at just under £60,000, against which must be set a debit balance of £37,000 liabilities of £16,156, and a loan of £72,052. Since that time operations have continued at a loss, so that it is obvious that even allowing for the sale of the plant and property, which, under present circumstances must be of doubtful value, very little will remain

for the holders of the 1,272,354 shares in issue.

The ordinary shareholders have, of course, already received a distribution of shares in Contin Finance, which was formed to take over certain of Consolidated Tin's interests outside Burma. These interests include 99 per cent of the equity of Mineral Products, a finance and investment company.

INDUSTRIAL AGREEMENT AT MOUNT ISA

An agreement has been ratified by the State Industrial Court between the Mount Isa Co. and its employees. Under the agreement the lead bonus has been fixed at a minimum of £5 per week; penalty rates of time and a quarter for Saturday work and time and a half for Sundays will be paid to all continuous shift workers, who will also receive an extra week's holiday, giving them a total of four weeks, two days per year. Different classifications will receive increases in wages of up to 8s. 5d. per week, and travelling time will be paid outside a three-mile limit.

A taxation question is now before the Courts. In a previous decision on an application by Mount Isa Mines, expenditure on the housing of employees, incurred by the company, was allowed as a deduction for income tax purposes. This decision appears to have been subsequently reversed, for the company has now appealed against the Taxation Commissioners who have refused to allow the deduction, contending that this charge is not a development charge, which must be for the actual development of the mine itself. The company contends, and rightly, that without efficient, and sufficient, labour the operation of the mine and works is impossible, and that without satisfactory housing and domestic conditions, it is impossible to obtain or hold labour.

Housing is a very heavy capital charge on all inland Australian mining enterprises and the establishment of a township with all the necessary amenities must be undertaken by the mining company, even before the potentialities of the mine have been satisfactorily established. A decision on the Mount Isa Co.'s appeal has not yet been made.

ANOTHER GOOD PERFORMANCE BY SELECTION TRUST

In a year as unrewarding for base metal dividends as that ended on March 31 last, the preliminary results of Selection Trust must be considered exceptionally satisfactory. Even Mr. A. Chester Beatty may have been pleasantly surprised, because last year, when he expressed the hope that the 7s. dividend rate would be maintained, he made it clear that revenue was likely to be lower.

In the event, revenue has proved to be £165,000 higher at £3,389,971, and with small reductions in tax and expenditure,

the net profit is more than £200,000 up at £1,712,772. The dividend remains at 7s. per share.

Most of the improvement in revenue appears to have been derived from Selection Investments, the ordinary capital of which is wholly owned by Selection Trust. In turn, the improvement in Selection's earnings must have been largely attributable to the "special interim dividend" of 1s. per share paid by Consolidated African Selection Trust in order to keep U.K. profits tax to a minimum. Without this windfall, therefore, it looks as though this year's results would have been closely comparable with last year's. In present circumstances, of course, this is still a creditable performance.

The explanation of this success must be looked for in the AMCO-Climax merger eighteen months ago. The AMAX holding represents about half by value of Selection Trust's assets, and it is almost certain that without the added stability provided by molybdenum, the American company would have been unable to maintain its common dividend at \$1.20 per unit.

MORE KAFFIR DIVIDENDS

The mid-year Rand dividend season continued this week with declarations by the mines of the Gold Fields and General Mining groups. The current distribution and the three preceding payments are summarized below.

Company	Dec. 1957	June 1958	Dec. 1958	June 1959
<i>Gold Fields</i>				
Doornfontein	1/-	1/-	1/6	1/6
Libanon	3½	3½	3½	3½
Luipaards V.	1/1	1/1	1/-	1/-
Rietfontein	1/1	1/-*	10*	6*
Robinson	9	1/6*	6*	—
Simmer	5	6*	6*	—
Sub Nigel	1/6	1/6	1/6*	1/6*
Venterspost	10½	10½	10½	10½
Vlakfontein	11	11	1/-	11
Vogels	1/2	1/-	1/-	11*
West Drie.	3/6	3/9	4/-	4/3
<i>General Mining</i>				
Buffels	1/6	1/6	1/6	1/6
S. Roodepoort	1/1½	1/1½	1/1½	1/1
Stillfontein	1/10½	1/10½	1/10½	1/10½
West Rand				
Cons.	2/3	2/-	2/3	2/-

* Capital Return.

Other Kaffir dividends announced this week include 1s. 9d. (same) from West Wits, 2s. 9d. (2s. 6d.) from New Pioneer, and 9d. (same) from Eastern Rand Extensions.

The change to capital repayments in the case of Vogelstruisbult was foreshadowed last month, when proposals were put forward to reduce the nominal value of the shares to 3d. If the necessary resolutions are passed at next month's extraordinary meeting, the board will be able to repay capital as and when it is available without the necessity of calling an E.G.M. for each individual distribution. Rietfontein and Sub Nigel are to follow a similar course.

Financial News and Results

Tin Fields of Nigeria.—Following Hart, Son and Co.'s unsuccessful bid for the shares of Tin Fields of Nigeria, the board of Tin Fields is calling an E.G.M. for June 22. The meeting will consider a resolution authorizing either the sale of the company's export quota or the disposal of the company's property and other assets.

Tweefontein Colliery to Change Name.—At the annual meeting of Tweefontein Colliery to be held on July 8, a special resolution will be proposed changing the name of the company to Tweefontein Investments. The change would avoid confusion with Tweefontein United Collieries, which is also quoted in London, and in which Tweefontein Colliery has a substantial shareholding. Net profit of Tweefontein Colliery in the year to March 31, 1959, was £15,208, compared with £12,673, both figures after tax.

No Capital Returns from Crown.—Replying to a question at the annual meeting of Crown Mines, the chairman, Mr. P. H. Anderson, said that it would be premature to begin capital repayments until the potentialities of the mine in the deeper areas below the Vierfontein Dyke had been fully explored. It was hoped that development work during the next twelve months or so would give some clarification.

Ampat Tin.—Taxed profits of Ampat Tin in the year ended December 31, 1958, were £48,719, compared with £44,107 in the preceding 12 months. The proposed final dividend of 20 per cent makes a total for the year of 30 per cent compared with 27½ per cent for 1957. Although sales were reduced from 1,150 tons to 591 tons as a result of export control, overheads and other costs were substantially reduced, making this satisfactory result possible. Meeting, June 30. Mr. J. Ivan Spens is chairman.

Idris' Profits.—At £10,161 after tax, profits of Idris Hydraulic Tin were sharply lower in the twelve months to December, 1958. The 1957 figure was £26,903, but this was distorted by special credits of £22,549 and a transitional O.T.C. tax refund of £9,549 against special credits of £5,015 and tax of £1,128 in 1958. The dividend and bonus is reduced from 75 per cent to 50 per cent, while the special distribution from the sale of the Kranji section is 6d. against 2s. Meeting, July 8.

Bremang to Pay 7½ Per Cent.—An increase in profit from £70,860 to £154,036 in 1958 has made it possible for Bremang Gold Dredging to recommend a dividend of 7½ per cent for the year, the first distribution for two years. The carry-forward is increased from £77,448 to £89,664. Meeting, June 12.

Modder B.—No Land Decision Yet.—At the annual meeting of Modder B. Gold Mines (now a 68 per cent subsidiary of Corner House Investment), Mr. F. E. Hay, the chairman, said that the Group Areas Act Board had still not given any indication as to which racial group will be permitted to occupy the company's property. Consequently, Modder B. is still unable to formulate any overall plan for the realization of its freehold.

LONDON MARKET HIGHLIGHTS

The sharp break on Wall Street which unsettled nearly all share markets on the London Stock Exchange this week also spoiled what had been another good start in gold shares. Free State Geduld, for instance, which had opened on Monday at a new peak of 198s. 1½d.—they reportedly changed hands at over £10 at the Cape—came back smartly to 195s. 7½d. Further ground was lost on the following day when the price dipped to 192s. 6d. Similar movements occurred throughout the Kaffir market, and it was not until Wednesday that a rather tentative recovery began to develop.

Even then the buying that reappeared was very selective. Welkom moved up to 25s. 3d. again following Cape and Paris demand, and talk of good initial underground development values inspired a rise to 22s. in Free State Saaiplaas. Stilfontein, which have been a rather nervous market lately, strengthened to 43s. following reports of the chairman's reassuring remarks at the recent meeting in Johannesburg, coupled with the maintained June half-yearly dividend. Otherwise the second batch of half-yearly dividends had little effect on shares apart from Doornfontein, which hardened to 34s. "Freddies" were firm at 11s. 9d. on a continued speculative demand, much of which came from Johannesburg.

In the Finance group, prices seemed particularly depressed after the recent advance that has taken place. Anglo American dropped several shillings to 192s. 6d. and Union Corporation came

back to 63s. 6d. The price of the latter was after making allowance for the fact that they are now ex the Bay Hall Trust issue. Bay Hall started in their nil paid form at 4s. premium. Central Mining eased to 85s. 3d. immediately before the sharply increased final dividend was made known.

A recovery in the diamond group was assisted by the De Beers meeting with its news of a continued rise in diamond sales. De Beers themselves were further helped by the announcement of a new venture in Basutoland and also their development of improved abrasive materials for industry, which were claimed to outdo the synthetic article. As a result De Beers recovered to 152s. 6d.

Copper shares were never really unsettled by either the break on Wall Street or the lower metal price, and prices soon went ahead when Wall Street rallied. Tins moved fairly narrowly. Profit-taking after the rise inspired by the bid of 23s. 6d. brought Geevor back to 24s. 9d. Ipoh jumped to 17s. 6d. on hopes that a similar situation might develop for their shareholders, while others in the group made a modest improvement in sympathy with the rise in the metal price.

Lead-zinc shares wilted with the rest of the markets during the early part of the week. Consolidated Zinc, which tend to move with industrials to a large extent these days, were thus particularly upset. But after tumbling to 64s. 6d., the shares later brightened to 65s. 3d.

PENGKALEN, LTD.

MAJOR W. E. HOSKING'S STATEMENT

The fifty-first Annual General Meeting of Pengkalen Ltd. was held on June 4 in Redruth.

Major W. E. Hosking (Chairman) presided.

The following is an extract from his Statement circulated with the Report and Accounts:

The Accounts for the financial year ended September 30, 1958, show a profit of £23,347 after payment to the Malayan Government of £21,988 for Royalty on ore sales and the provision of £17,200 for United Kingdom and Malayan taxation.

Dividends paid were 9d. per share on the Preferred Ordinary shares and 7 4/5d. per share on the Ordinary shares before Capital reorganization, and 3d. per share after the reorganization. A Special Cash Capital Dividend of 2d. per share was also paid on March 26, 1959. This payment was made possible by the sale of the remains of the No. 1 Dredge sunk during the Japanese occupation of Malaya.

To the available balance of £5,982 there has been added the sum of £5,260 in respect of taxation provision at September 30, 1957, no longer required.

The sum of £2,598 has been written off Capital Expenditure; £1,041 debited in respect of expenses of Capital Repayment and Reorganization, and £5,820 has been transferred to General Reserve. The balance unappropriated at September 30, 1958, was £62,839.

As from April 6, 1957, the Company has been treated for taxation purposes as an Overseas Trade Corporation, and the taxation provisions for the year under review have been made on this basis.

Unfortunately, in the Malayan Budget for 1959, Company Tax has been increased from 30 to 40 per cent.

The Report of the General Managers, Messrs. Osborne & Chappel, clearly sets out comparative figures of ground treated, tin-ore recovery, etc. Owing to the severe limitations imposed by the Malayan Tin Control Regulations, the volume of ground treated was lower at 1,512,600 cubic yards (compared with 1,768,600 cubic yards in respect of the previous year), and the amount of tin-ore recovered decreased from 470.27 tons to 298.10 tons. The recovery per cubic yard was lower at 0.33 kati compared with 0.45 kati per cubic yard. The cost per cubic yard at the mine increased from 47.97 cents to 55.64 cents, and the price received for the tin-ore sold showed a decrease from £473 per ton to £444 per ton.

Since the close of the financial year Shareholders have been advised of the production of tin-ore as follows:

October 1, 1958, to December 31, 1958, 854 piculs (50½ tons).

January 1, 1959, to March 31, 1959, 973 piculs (58 tons).

The report and accounts were adopted.

GOPENG CONSOLIDATED

MAJOR W. E. HOSKING'S STATEMENT

The forty-sixth Annual General Meeting of Gopeng Consolidated Ltd. was held on June 4 in Redruth.

Major W. E. Hosking (Chairman) presided.

The following is an extract from his circulated Statement:

The Accounts for the financial year ended September 30, 1958, show a profit of £74,240, after payment to the Malayan Government of £40,325 for Royalty on ore sales, and the provision of £39,465 for United Kingdom and Malayan taxation. Four dividends—each of 3d. per 3s. 6d. Unit of Stock—paid in respect of the year under review absorbed a nett amount of £45,513. From the available balance £15,614 has been written off Capital Expenditure, and £10,423 transferred to General Reserve. The balance unappropriated at September 30, 1958, was £52,507.

As from April 6, 1957, the Company has been treated for taxation purposes as an Overseas Trade Corporation, and the taxation provisions for the year under review have been made on this basis.

Unfortunately, in the Malayan Budget for 1959, Company Tax has been increased from 30 to 40 per cent.

The Report of the General Managers, Messrs. Osborne & Chappel, issued with the Accounts, clearly sets out comparative figures of ground treated, tin-ore recovery, etc. Owing to the severe limitations imposed by the Malayan Tin Control Regulations, the volume of ground treated was lower at 1,625,400 cubic yards (as compared with 2,388,400 cubic yards during the previous year), and the amount of tin-ore recovered was reduced from 14,600.66 piculs during the previous year to 9,596.50 piculs during the year under review. The recovery per cubic yard was slightly lower at 0.59 kati, compared with 0.61 kati per cubic yard. The cost per cubic yard increased from 61.54 cents to 79.37 cents. The price received for tin-ore was £429 per ton compared with £457 per ton in respect of the year ended September 30, 1957.

From the Moynalty Estate a profit of £7,766 resulted, and from the Sanglo Estate, in which your Company owns a half-interest, the half-share of profit was £4,167. In addition, refunds of Replanting Cess and Grants amounted to £3,826.

Since the close of the financial year, Stockholders have been advised of the production of tin-ore as follows:

October 1, 1958, to December 31, 1958, 1,549 piculs (92½ tons).

January 1, 1959, to March 31, 1959, 1,830 piculs (109 tons).

French Tekkah

As Stockholders have been advised, the purchase, jointly with The Kinta Tin Mines Ltd., of the French Tekkah property has now been completed, and possession taken of the property and plant by the General Managers on behalf of both Companies.

The purchase of this undertaking in Malaya is a most valuable acquisition, including as it does three hydroelectric power stations producing a substantial supply of electrical energy at low cost, a 30-inch pipeline for pressure water

supply to the mines, some reserves of mining land and additional areas for future dumping of tailings, and certain advantages regarding assessment under the Tin Control Regulations. Consequently your Directors are confident that the low-cost electrical power thus acquired will be of great benefit to this Company and to The Kinta Tin Mines Ltd. for such future problems as the disposal of tailings cheaply, and the economic exploitation of ore reserves in depth. Additional water from the pipeline will also enable both Companies to increase

their productive capacities when circumstances permit.

Stockholders will realize that considerable reorganization will be necessary in order to integrate the new acquisition with the schemes of work of both Companies, and that the full benefits will become apparent only when the hampering restrictions imposed by the Tin Control Regulations are considerably eased. In the meantime, some additional revenue will accrue from existing workings formerly under French Tekkah management. The report and accounts were adopted.

MIDDLE WITWATERSRAND (WESTERN AREAS) LIMITED

(Incorporated in the Union of South Africa)

CHAIRMAN'S REVIEW

The following is a review by **Mr. S. G. Menell**, Chairman, Middle Witwatersrand (Western Areas) Limited, which accompanies the Annual Report and Accounts for the year ended December 31, 1958.

Mainly as a result of increased dividend income, your company's trading profit for the year was £438,455, which was £183,008 more than the trading profit earned during the preceding year. A dividend of 1s. 0d. per share was paid for the year in comparison with 6d. per share for the previous year. The bulk of the company's gross income is still derived from the Klerksdorp area mines in which it is interested. It will be some years before a substantial income can be expected from investments in the Orange Free State mines.

During the year your Company participated with Anglo-Transvaal Consolidated Investment Company, Limited in the sale of shares in Anglo-Transvaal Collieries Limited, Buffelsfontein Gold Mining Company Limited, Free State Saaiplaas Gold Mining Company Limited, Hartbeestfontein Gold Mining Company Limited, and Stilfontein Gold Mining Company Limited, to the American-South African Investment Company Limited. The purchase consideration of £893,363 substantially strengthened the liquid position of the company. The surplus of £534,100 resulting from this transaction was not subject to tax, and although not included in the trading profit for the year, is shown as a separate item in the profit and loss account. This profit was utilized to write down certain investments, the book values of which were higher than market prices or directors' valuations as at December 31, 1958, to write off expenditure on exploratory work to a nominal figure of £1, and to increase the balance of the unappropriated profit carried forward.

Although the balance sheet reveals an increase of £20,611, equal to about 1 per cent, in the book value of quoted investments as at December 31, 1958, compared with the previous year, the market value has increased by £1,170,875 (approximately 18 per cent). Since the end of the year there has been a further increase in the market value of quoted investments.

During the year your company participated in the flotation of the Zandpan Gold Mining Company Limited, and members were given the right to subscribe for shares in this new gold mine in the Klerksdorp area. This is the eighth gold mining flotation in which we have played a major part during the past ten years.

As a result of the Loraine/Riebeeck merger which took place during the year 9 Loraine Gold Mines Limited shares were received for every 7 shares held in Riebeeck Gold Mining Company Limited. Since the end of the financial year Loraine (as reconstructed) raised £3,072,669 additional capital by the offer of one Loraine share of 10s. for every 4 Loraine shares held at a price of 20s. per share. Your company participated in the subscription of these new shares.

A vigorous prospecting programme was continued during the year. Mineral options were acquired in partnership with other parties over two separate blocks of ground, one (the Bothaville block) in the Bothaville, Odendaalsrus, and Wesselsbron districts of the Orange Free State and in the Wolmaransstad district of the Transvaal, and the other (the Dealesville block) in the Bloemfontein, Brandfort, Boshof, and Bultfontein districts of the Orange Free State. Drilling programmes have been commenced on both of these areas. The drilling programme in the area east of the Hartbeestfontein and Buffelsfontein mines was continued. Active investigations have been carried out on the various nickel, chrome, copper, and other base metal prospects in the Central African Federation in which the company is interested.

Your company has extended its interests in township development through its subsidiary, Virginia Land & Estate Company Limited, which has subscribed for 80 per cent of the share capital of Cato Ridge Development Company Limited. The Cato Ridge company has acquired approximately 2,200 acres of ground in the Cato Ridge area 17 miles from Pietermaritzburg and 33 miles from Durban. It is proposed to lay out industrial business and residential townships to cater for the housing needs of Ferroalloys Limited which is in the course of establishing a ferro-manganese plant at Cato Ridge, and for the requirements of other industries likely to be established in the area.

In conclusion I desire to place on record your Board's appreciation of the services rendered by our secretaries and technical advisers, Anglo-Transvaal Consolidated Investment Company, Limited, both at the head and London offices, and also by the managers and staffs of our subsidiary companies.

The Annual General Meeting of Shareholders will be held at Anglovaal House, 56 Main Street, Johannesburg, on Monday, June 29, 1959, at 11 a.m.

THE CENTRAL PROVINCES MANGANESE ORE COMPANY

CHANGED PATTERN OF TRADING

EFFECT OF FALL IN STEEL PRODUCTION

MAJOR A. C. HERRING'S CONFIDENCE IN THE FUTURE

The 51st Annual General Meeting of The Central Provinces Manganese Ore Company Limited was held on June 10 at Winchester House, Old Broad Street, London, E.C.2. Major A. C. Herring, V.C., A.C.A., the chairman presiding.

Mr. T. D. de Deney, F.C.I.S. (the Secretary), read the notice convening the meeting and the report of the auditors.

The Chairman said:

Ladies and Gentlemen.—The Report and Accounts for the year ended December 31, 1958, have been in your hands for the requisite period, and with your permission I will take them as read. (Agreed.)

You will have seen from our Accounts that the profit for 1958 showed a considerable reduction compared with that of 1957. This was substantially due to the falling off in shipments during the second half of the year; this I rather foreshadowed in my Speech last June. The trading profit for the year was £1,601,953 as compared with £3,046,635 for 1957 after transfer of £200,000 to Ore Stock Reserve. I think it would be wise, however, to look upon the year 1957 as an exceptionally good year.

Income from Investments and Bank Interest both showed a considerable advance. The latter, of course, being due to the fact that with a high Bank Rate "interest on deposit" was also at a high level, and that we then had considerable sums available which at a later date were required to pay the accrued heavy taxation on our previous profits. The net profit available after taxation is £511,357 as compared with £1,010,345 for the previous year. Your Board has considered it appropriate in present circumstances to make an addition of £27,091 to Contingencies Reserve.

Balance Sheet Features

Turning to the Balance Sheet, the principal points of interest are that our Ore Stock shows an increase of some £90,000. In view of the fact that deliveries during the latter half of the year were small, I do not think this is unsatisfactory, especially as we have an Ore Stock Reserve of £700,000 which is fully justified at this time.

British Government Securities and Cash at Bank both show appreciable reductions, owing primarily to the fact that we had to meet heavy liabilities for taxation on prior profits. Our reserve for future taxation, you will notice, is reduced from £1,334,000 to £476,000.

An Interim Dividend has been paid of 1s. 2d. per Unit free of tax, and it is now proposed to pay a Final Dividend of 1s. 8d. per Unit and a Bonus of 4d. per Unit, both free of Income Tax, this will require £475,000, leaving after various small appropriations £307,524 to be carried forward as compared with £313,537 brought in.

Trading Conditions

In my Speech in June last year, I mentioned that the Steel Industry of the United States was passing through a difficult period, and as you probably know, steel production in that country for 1958 showed a considerable fall. To a lesser degree, I think it would be fair

to say that this situation occurred in all the main steel-producing countries. The Manganese Ore trade depends almost entirely upon the activity in the Steel Industry, and consequently it is obvious that if steel production falls our Company suffers. During the first six months of last year, in spite of the fact that steel production had already fallen considerably, our deliveries were good. The effect of this, of course, was that stocks of Manganese Ore were being accumulated by the steel producers; as a consequence our deliveries during the last six months showed a big fall.

Statistics indicate that there is now quite a substantial increase in steel production in the United States of America, but the inference from this must be treated with a certain amount of reserve, as it is possible that production has been intensified for the last few months in anticipation of the possibility of a strike in the Steel Industry in that country in July. This, of course, may or may not occur.

Changed Situation

So far as we are concerned, I do not think it can be anticipated that the demand for Manganese Ore will increase very much until stocks at consumers' works have been reduced, and this will probably take some considerable time. Since the war the Manganese Ore Industry has been in a fortunate position—steel production has steadily increased whilst there has been a shortage of Manganese Ore. This shortage was accentuated in our own particular case by the non-availability of sufficient railway wagons to move our Ore to ports. During the past year this situation has changed, steel production has fallen, new deposits are now in operation, and consequently there has been ample supply of Manganese Ore.

I think the above summarizes the present situation and sounds rather doleful, but all businesses have their ups and downs, and I am confident that steel production will, over the years, continue to expand and that there will be a full demand for our Ore, which has a world-wide reputation. The Company has adequate financial resources for its requirements, our mines are in good shape, and we are working in close collaboration with the Authorities in India. They and we are most anxious to increase the export of Ore, and I have no doubt that although deliveries so far this year have been rather moderate, these will gradually pick up as the Steel Industry recovers. It will, however, I think require a little patience.

Mr. Hardy has paid visits to India in order to inspect the Mines and also to keep in close contact with the Indian Authorities. I am pleased to say that he found the mines in satisfactory condition.

Despite the lesser demand for ore, we have so far been able to avoid dismissing any of our labour force by concentrating them on removing overburden with the consequent fall in our output of Ore. We hope that market conditions will improve in good time so that we may not be forced to consider any retrenchment of labour which has had to take place at

the mines of many other producers, particularly those producing low-grade ores.

Diamond Drilling

During the year diamond drilling took place at Sitasaongi Mine, and this in conjunction with normal exploration work has proved that a large reserve of ore remains at this mine. Diamond drilling was commenced at New Tirodi Mine.

Shaft sinking continued at Balaghat Mine and a shaft station is now being installed at No. 6 level. The Tirodi Mine was connected with the Government electricity grid, and the new equipment consisting of a crushing and conveying system for spoil has been brought into successful operation, as well as an electric shovel and compressors.

Wherever possible, economies have been made in our operations which has meant the restricted use of mechanized plant on some of the mines, and the H.M.S. Plant at Dongri Buzurg Mine has been shut down until the demand for ore from this mine increases.

Tributes

We again have to thank our Agents in India, Messrs. James Finlay & Company Limited, for their valuable services throughout the year.

We are fortunate in having such an able and loyal staff, both in this country and in India, and I would like to extend to them our thanks for their continued efforts during the past year, which has been a somewhat difficult one.

I now beg to move: "That the Report of the Directors and Statement of Accounts as at December 31, 1958, be and are hereby approved and adopted, and that the profits be appropriated as recommended by the Directors". I will ask Mr. Holmes to second the motion, and before putting it to the Meeting I will endeavour to deal with any questions which Stockholders may wish to ask.

Mr. H. R. Holmes seconded the resolution, which was carried unanimously.

The Board's proposal of a Final Dividend of 1s. 8d. per Unit, free of tax, and a Bonus of 4d. per Unit, free of tax, was also approved.

The retiring director, Major A. C. Herring, V.C., A.C.A., was re-elected, and the remuneration of the auditors, Messrs. W. A. Browne & Co., having been fixed, the proceedings terminated.

Obituary

MR. A. T. HOLMAN

We regret to report the death of Mr. Arthur Trevena (Treve) Holman, aged 66, of Chyverton, near Truro, which occurred in Lisbon on June 6. Educated at Blundell's School, Tiverton, he studied engineering at Birmingham University.

In 1914 he became a director of the engineering company of Holman Bros. Ltd., Camborne. During his half-century of active association with the company, Mr. Holman had helped to expand the Holman works to its present extent, making the company the largest manufacturers of compressed-air equipment in the Commonwealth.

In 1945, after the death of his cousin, Mr. J. Leonard Holman, Mr. Treve Holman became chairman of the company, and for a considerable time he was also joint managing director with Mr. P. M. Holman. He relinquished this appointment for health reasons.

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Publications Received

Aluminium for Insulated Cables, published by Aluminium Union Ltd., is the fourth in the company's series of authoritative electrical handbooks, and gives a detailed account of cable manufacturing methods using aluminium. This well-illustrated 72-page book contains a survey of established designs of aluminium conductor and aluminium sheathed cables which is more complete than in any publication previously available. The techniques of jointing and installation are fully treated.

Engineering progress and achievements of 1958 are graphically described in the new edition of *Engineering in Action* at Allis-Chalmers, an annual publication recently released by a United States (Milwaukee) firm. The 36-page two-colour magazine is produced by the Industries Divisions of the company. The divisions' products include equipment for the generation, transmission, and distribution of electric power, as well as a wide variety of equipment for all industries. Covering all phases of activities within the Industries Divisions, the magazine includes chapters on research, power generation, nuclear power generation, general industry, government and marine, plant facilities, operations in Canada, and Allis-Chalmers International.

A new and comprehensive catalogue has been issued by G. Hunter (London) Ltd. It covers in 174 pages cranes, hoists, lifting tackle, jacks, conveyors, stackers, fork trucks, pallets and stillages. There are sections on modernization of dispatch bays, and instructions on designing your own gravity roller conveyor. It is the first time that one publication has attempted to cover all aspects of mechanical handling.

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This feature appears every fourth week

At the Meeting on May 2, 1959, at Nesburg, Chairman said:—

Gentlemen, the meeting which I have called and it is your duty as Directors of the year which I have called, have details of the information of the G

As will be seen from the profit for 1958 of £683,347, which is a record for the year, but the book profits for the year are £130,000, which is a record for the year. The book profits for the year are £130,000, which is a record for the year.

Dividends increased to £130,000, which is a record for the year. The book profits for the year are £130,000, which is a record for the year. The book profits for the year are £130,000, which is a record for the year.

After the meeting of 2s. 9d. transfers were made to the reserve and the account was £130,000, which is a record for the year.

Despite the fact that the account was £130,000, which is a record for the year. The book profits for the year are £130,000, which is a record for the year.

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RAND MINES, LIMITED

(Incorporated in the Union of South Africa)

MR. CHARLES W. ENGELHARD'S VIEWS ON THE FUTURE OF GOLD

At the Sixty-fourth Ordinary General Meeting of Rand Mines, Limited, held on May 28 at The Corner House, Johannesburg, Mr. Charles W. Engelhard, the Chairman, in the course of his remarks, said:—

Gentlemen,—This is the first annual meeting of Rand Mines, Limited, at which I have had the honour to preside, and it is my pleasure today to address you as Chairman of the Company. The Directors' Report and the Accounts for the year ended December 31, 1958, which are now submitted for your adoption, have been in the hands of shareholders for some weeks. In addition to details of your Company's activities during the past year, the report contains information about the various companies of the Group.

Financial Results

As will be seen from the accounts, the profit for 1958 at £1,498,685 was £683,347 more than that for the previous year, but £409,396 of this represented a book profit on the exchange of certain shares for shares in Harmony Gold Mining Company Limited and The Corner House Investment Company Limited. Excluding the latter figure, the increase in profit was £273,951.

Dividends received from investments increased by £173,688, of which about £130,000 is attributable to new and additional investments and the balance to increased dividends paid by various companies. The Company was fully invested at the year-end, sufficient cash having been retained to meet current requirements, while a portion of its funds are in investments readily realizable when required for any proposition offering a favourable return. The increase of £84,196 in interest received arose mainly from a loan of £1,000,000 to the Harmony Company.

After allowing for two dividends, one of 2s. 9d. and the other of 3s. per share, transfers of £450,000 to investment reserve and £250,000 to exploration reserve respectively, an amount of £412,027 was carried forward in the profit and loss account at the end of the year.

Despite the large transfer to investment reserve, the balance of £7,305,385 at the end of the year showed little change due to depreciation on certain investments being charged direct to the reserve.

The book value of the quoted and unquoted investments increased by £1,198,782 to £9,527,466 and the Stock Exchange value of quoted investments was £3,916,911 higher at £14,509,938. Our investments in certain of the newer mines have not as yet reached their full dividend potential, while some have still to reach the dividend-paying stage.

Exploration

The reserve for exploration has been substantially increased because it is anticipated that expenditure on prospecting and exploration will be greater than in recent years. The Company has had many propositions before it during the past year and is at present investigating, either on its own account or jointly with certain other Groups, a total of nine prospects in the Union and neighbouring territories. Six of these are for gold, one is for coal, one is for copper, and one is of a general exploratory nature, principally for copper, cobalt and gold. Drilling is already being done or is about to begin on a number of the areas concerned. Since the close of the financial year a new company has been registered in Southern Rhodesia for the purpose of examining the mineral—particularly copper—possibilities of nearly 500 square miles in the Karoi District of Southern Rhodesia, over which two prospecting orders have been provisionally granted by the Government. Field work in this large area has been started. One borehole has been completed and a further borehole is in progress. It will be appreciated, however, that much more exploratory work will have to be done before the potentialities of this and other areas can be assessed.

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Uranium

I might mention that it is my view that the long-term future of uranium is unquestionably sound, but that, on the other hand, there will be an interim period between expiration of the existing contracts and the full development of uranium for peaceful uses where there will, no doubt, be an over supply.

There will also be an attempt on the part of uranium producers in various parts of the world to assure the sale of their material because uranium, unlike gold, will have to be sold just like any other commodity. I am convinced that the authorities, both in the industry and in the government, are fully aware of this and are taking steps to develop the private sale of uranium, and I would only like to add that any research which can be done towards the development of additional refining or manufacturing of uranium so that it can be produced in its most saleable form under Union auspices, either here or abroad, will inevitably result in a better sales potential.

Future of Gold

Obviously of great importance to Rand Mines is the future of gold and the price of gold. You will, no doubt, however, appreciate that this is a controversial subject and that there is no man alive who can accurately foretell exactly when the price of gold will be changed. It is, however, clear that there has been increasing speculation and discussion on this question, stimulated to some extent by the substantial losses of gold which have occurred in the United States. If these losses continue, they will become an increasingly serious matter to the United States and, quite clearly, will give rise to further discussion as to the advisability of changing the gold price. Although these losses are stimulated by foreign aid and loss of trade, it would be wrong at this time to say that there is any basic flight from the dollar because the dollar is still the world's strongest currency, and in all probability will remain so. It is true, however, that it is not as strong as it was and is subject to increasing pressure from abroad, where national banks are converting dollar holdings to gold. In my opinion, the basis of a change in the gold price is not, however, so much the possible weakness of the dollar or advantages that would accrue to South Africa by such an increase, but rather that such an increase would be a tremendous boon to free world economy particularly if it were coupled with some form of modified gold standard which could result in the elimination of many current currency restrictions, thereby greatly increasing the potential flow of trade. There is no question that the world looks on gold as the basic international medium of exchange and no paper currency can replace the value of gold in this regard.

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Future Prospects

I, like my other colleagues on the board, am most interested in South Africa and its possibilities for industrial and economic expansion, and I feel that the future of the country, and for your Company, is full of promise. It remains for us to seek new fields of investment, to conduct our exploration programme energetically, and to take advantage of opportunities for expanding the Company's interests and business whenever suitable opportunities occur. I can assure you that every effort is being made, and will continue to be made in this direction, and it is my belief that your Company, which contributed so much in earlier years to the economic development of South Africa, will continue to play a leading part in its future.

Coal and Iron in Vietnam

Coal exported from the Democratic Republic of Vietnam (North Vietnam) in 1958 was 20 per cent higher than in 1957, and exceeded the target set at the beginning of the year by 6 per cent.

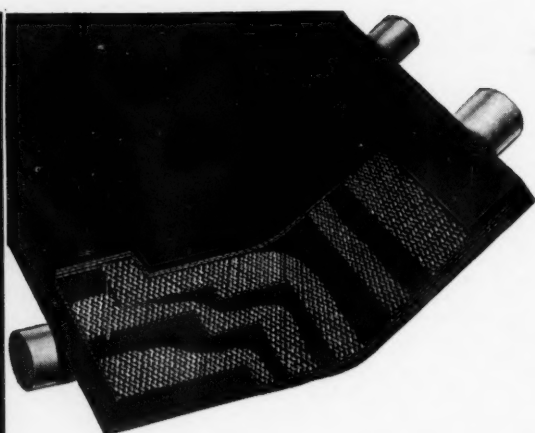
This increase was made possible largely by the raising of the output of the Hong Gai coalfield by some 32 per cent. A further increase is expected this year.

The list of countries to which coal has been exported is already growing, and is expected to be much further expanded as the result of inquiries made by a number of countries in Western Europe, Latin America, and the Far and Middle East.

Capital construction is to be increased six times this year, as compared with 1958. Of the 201 enterprises which are projected, 100 are of an industrial character, and include seven mines of various kinds, an integrated iron and steel works, six power stations, and numerous factories.

The integrated iron and steel works, the first of their kind in any part of Vietnam, are to be located at the provincial centre Thai Nguyen, about 47 miles north of the capital, Hanoi, and should be sufficiently completed by the end of the present Three-Year Plan (1960) to produce 100,000 tonnes of pig iron annually. Thereafter, they will be completed to their full annual capacity of 200,000 tonnes of pig iron. Their projected output of steel and rolled steel products is not yet stated. They are to be built with assistance from China, which recently agreed to make a free gift of 100,000,000 yuan and a loan of 300,000,000 yuan for the execution of 48 projects in connection with industry and communications.

For the Thai Nguyen project mentioned, a new railway complex must be constructed to link it with the various coal mines in the province of the same name.



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